Geologic

Characterization

Report

Appendix C

GEOLOGIC CHARACTERIZATION REPORT

APPENDIX C

ANNOTATED BIBLIOGRAPHY
ON THE GEOLOGY
OF THE ROCKY FLATS PLANT
AND VICINITY

For U.S. DOE-Rocky Flats Plant

July 31,1991

EG&G ROCKY FLATS

ADMIN RECORD

REVIEWED FOR CLASSIFICATION
By
Date 12/16/91

ANNOTATED BIBLIOGRAPHY

ON THE GEOLOGY

OF THE ROCKY FLATS PLANT

AND VICINITY

SOURCES FOR REFERENCED MATERIALS

USGS (U S. Geological Survey)

o Library
Denver Federal Center
2nd Avenue, Bldg 20
2nd Floor, Room 2002
Denver, Colorado 80225
(303) 236-1000
Photocopy Service
paper 20/page

o Map Distribution
Federal Center, Box 25286
Denver, Colorado 80225
(303) 236-7476

o Books and Open-File Reports
Federal Center, Box 25425
Denver, Colorado 80225
(303) 236-7476

o Public Inquiries Office
169 Federal Building
1961 Stout Street, 1st. Floor
Denver, Colorado 80294
(303) 866-4169

NTIS (National Technical Information Center)
U S Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151

RFP (Rocky Flats Plant Library, Wind Site)
P O Box 464
RCRA Building 250
Golden, Colorado 80402
(303) 966-7041

CO Div. of Water Res. (Colorado State Division of Water Resources)
Department of Natural Resources
1313 Sherman Street, Room 823
Denver, Colorado 80203
(303) 866-3587

CO Geol. Srv. (Colorado State Geological Survey)

Department of Natural Resources
1313 Sherman Street, Room 715
Denver, Colorado 80203
(303) 866-2611

CO O&G Comm. (Colorado State Oil and Gas Commission)

Department of Natural Resources
1580 Logan Street, Suite 380
Denver, Colorado 80203
(303) 894-2100

Denver Earth Resources Library
1531 Stout Street, Suite 200
Denver, Colorado
Kay Waller, Manager
(303) 825-5614

RMAG (Rocky Mountain Association of Geologists)
1531 Stout Street, Suite 210
Denver, Colorado 80202
(303) 573-8621

PIC (Petroleum Information Center)
518 17th Street, Suite 600
Denver, Colorado 80201
(303) 825-2299

W.W. Wheeler and Associates
3700 South Inca Street
Englewood, Colorado 80110
(303) 761-4130

Woodward Clyde Consultants
Stanford Place 3
4582 South Ulster Street Parkway
Suite 1000
Denver, Colorado
(303) 694-2770

CSM (Colorado School of Mines)
Arthur Lakes Library
14th and Illinois
Golden, Colorado 80401
(303) 273-3698

<u>Photocopy Service</u>

paper	25/page
transparencies	50/page
thesis on fiche	$15/thesis
fiche to fiche	50/fiche

PUBLICATIONS

Allen, J.R.L., 1965, A Review of the Origin and Characteristics of Recent Alluvial Sediments, Sedimentology, v.5, p.89-191. Source: CSM Library.

Review from geologic standpoint of existing information on alluvial sediments in relation to the circumstances, nature, and behavior of streams today Discusses relationships of alluvial sediments to stream setting and behavior Discussion includes background information on the physiography-drainage basin and net, stream channel hydraulic geometry, the dynamics of water flow, how fluid forces act on sediment particles, transport and deposition of sediments, the morphological activities of streams, and channel or substatum deposits Text accompanied with graphs, charts, and diagrams Includes an addendum received January 19th, 1965

Aguirre Engineers, Inc., 1988, Subsurface Investigation and Engineering Analysis Report, Electrical System Upgrade, Phase I, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Black and Veatch, Project no. 18,012, 35 p., 22 pl., 1 table. Source: RFP Library.

Results of a subsurface investigation and engineering analysis along the route of the proposed electrical system upgrade, phase I. Provides overview of site topography and vegetation and extensive explanation of subsurface conditions from the drilling of 29 exploratory borings. Subsurface materials encountered were asphaltic concrete pavement, base course, natural soils of clay, sand, and gravel mixtures, and ground water Summaries of laboratory tests include swell/ consolidation, gradation analysis, percent fines, natural dry density, natural moisture content, atterberg limits, water soluble sulfates, and pH Incorporates ground water data.

Aguirre Engineers, Inc., 1988, Final Subsurface Investigation and Engineering Analysis Report, Electrical System Upgrade, Substation and Control Building Structures, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Black and Veatch, Project no. 18,012A, 41 p., 13 pl., 2 tables, boring logs. Source: RFP Library.

Results of a subsurface investigation and engineering analysis at the site of the proposed electrical system upgrade, Substation and Control Building Provides overview of site topography and vegetation and extensive explanation of subsurface conditions from the drilling of nine exploratory borings Subsurface materials encountered were asphaltic concrete pavement, base course, fill of clay and sand, natural soils of clay, sand, and gravel mixtures, weathered claystone bedrock, and ground water Summaries of laboratory tests include swell/consolidation, gradation analysis, natural dry density, natural moisture content, percent fines, atterberg limits, water soluble sulfates, and pH Incorporates ground water data and boring logs

Aguirre Engineers, Inc., 1988, Subsurface Investigation and Engineering Analysis Report, Electrical System Upgrade, Phase II, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Black and Veatch, Project no. 18,012B, 36 p., 26 pl., 1 table, boring logs. Source: RFP Library.

Results of a subsurface investigation and engineering analysis along the route of the proposed electrical system upgrade, phase II. Provides overview of site topography and vegetation and extensive explanation of subsurface conditions from the drilling of 53 exploratory borings Subsurface materials encountered were asphaltic concrete pavement, base course, fill of clay with some sand and gravel, natural soils of clay, sand, and gravel mixtures, weathered bedrock of claystone and sandstone mixes,

and ground water Summaries of laboratory tests include swell/consolidation, gradation analysis, percent fines, natural dry density, natural moisture content, atterberg limits, unconfined compression, water soluble sulfates, and pH Incorporates ground water data and boring logs

Aguirre Engineers, Inc., 1989, Addendum to Subsurface Investigation and Engineering Analysis Report, Electrical System Upgrade, Phase II, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Black and Veatch, Addendum to Project no. 18,012B, 2 p., 10 pl., 1 table, boring logs. Source: RFP Library.

Addendum to a subsurface investigation and engineering analysis, Project no 18,012A Provides additional information for borings 12, 14, 16, 35, 44, 47, 49, and 58 and summary of swell/consolidation laboratory tests Subsurface materials encountered were asphaltic concrete pavement, base course, fill, natural soils, weathered bedrock, and ground water Incorporates boring logs

Aguirre Engineers, Inc., 1989, Final Subsurface Investigation and Engineering Analysis Report, Electrical System Upgrade, Phase II, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Black and Veatch, Project no. 18,012C, 32 p., 30 pl., 2 tables, boring logs. Source: RFP Library.

Results of a subsurface investigation and engineering analysis along the route of the proposed electrical system upgrade Provides overview of site topography and vegetation and extensive explanation of subsurface conditions from the drilling of 26 exploratory borings Subsurface materials encountered were topsoil, asphaltic concrete pavement, base course, fill of clay and some sand and gravel, natural soils of clay, sand, and gravel mixtures, weathered bedrock of claystone and sandstone mixes, and ground water Summaries of laboratory tests include swell/consolidation, gradation analysis, percent fines, natural dry density, natural moisture content, atterberg limits, unconfined compression, water soluble sulfates, pH and electrical resistivity Incorporates ground water data and boring logs

Ackermann, H.D., 1974, Shallow Seismic Compressional and Shear Wave Reflection and Electrical Resistivity Investigations at Rocky Flats, Jefferson County, Colorado, USGS Journal of Research, vol. 2, no. 4, p. 421-430. Source: USGS Library (200)qJ 827.

Seismic refraction and electrical resistivity investigations at Rocky Flats, a gravel capped pediment, indicates an irregular bedrock surface which ranges in depth from 3 to 27 m (10-90 ft) Layers within the gravel that were revealed by interpretation of seismic and electrical data do not correlate, but the combining of results reveals information about water saturation and elastic properties of the overburden Velocity variations within the bedrock affect depth calculations Includes bedrock profiles, variations in velocity, resistivity, and elastic constants within the Rocky Flats Alluvium, and resistivities within the Laramie Formation. Maps show geophysical measurements and bedrock geology

Adams, J.W., Gude, A.J., III, and Beroni, E.P., 1953(R 54), Uranium Occurrences in the Golden Gate Canyon and Ralston Creek Areas, Jefferson County, Colorado, USGS Circular 320, 16 p. Source: USGS Library R(200)Ci, USGS free on request.

Presentation on the occurrence of pitchblende at nine localities in the northern part of Jefferson County, in shear zones that cut Precambrian metamorphic and igneous rocks, chiefly hornblende gneiss, biotite schist, and granite pegmatite The known deposits are in the vicinity of Ralston Creek and the Golden Gate Canyon Three pitchblende bearing deposits can be found in a small area of Ralston Creek, namely--North Star, Schwartzwalder, and Nigger Shaft Includes analysis of samples from the deposit areas, map and section of underground workings for North Star and Schwartzwalder mines, and geology diagram for Nigger Shaft

Amuedo and Ivey Geological Consultants, 1981, Inactive Coal Mines of the Front Range Area Inactive Mine Reclamation Program, Division of Mined Land Reclamation, State of Colorado

NEW DOCUMENT AS OF 9/1/89, AS REFERENCED IN BIBLIOGRAPHY-SEE HATTON

Amuedo and Ivey Geological Consultants, 1975, Coal Mine Subsidence and Land Use in the Boulder-Weld Coalfield, Boulder and Weld Counties, Colorado, CO State Geological Survey Environmental Geology 9, 92 p., 32 figs., 6 pl. Source: CO Geol. Srv., CO Geol. Srv. distributes text $4/set of text and 6 plates $25.

Study to delineate the extent of mining in the major portion of the Boulder-Weld coal and the physical factors controlling subsidence including the extent of pillar removal, the thickness of extracted coal, the depth of cover above mine workings, and the times of mine operations Study area extends northeastward from Marshall (four miles south of Boulder) to just north of Firestone, two miles east of Interstate 25--approximately 160 square miles in T 2 N to T 1 S, R 70 W to R 67 W) Discusses stratigraphy of the Fox Hills sandstone, Laramie Formation, and Quaternary deposits, structure, and physical characteristics of the geologic section Includes maps, tables, low-sun-angle photography and aerial photos The most important product of this study is a subsidence hazard map

Baker, V.R., 1973, Paleosol Development in Quaternary Alluvium Near Golden, Colorado, Mountain Geologist, vol. 10, no. 4, p. 127-133. Source: USGS Library G(200)M 864, RMAG $5.

Reports on Quaternary river terraces near Golden which are underlain by Verdos, Slocum, Louviers, and Broadway Alluvium Characteristics of Brown paleosols developed on these surfaces form the principal basis for correlation to other Quaternary alluvial deposits in the Colorado Piedmont A general trend of carbonate horizon development with age is revealed in thickness of carbonate accumulation, Cca horizon morphology, and pebble weathering Includes rock stratigraphy and paleosol development

Baker, V.R., 1974, Paleohydraulic Interpretation of Quaternary Alluvium Near Golden, Colorado, Quaternary Research, vol. 4, no. 1, p. 94-112. Source: USGS Library 352 Q28r

Reports that Quaternary terraces and pediments along Ralston Creek and Clear Creek, near Golden, are associated with the Verdos, Slocum, Louviers, and Broadway Alluviums Terrace deposits can be locally correlated on the basis of elevation and relict paleosols Terrace sediments probably represent aggradation by braided streams flowing from glaciated drainage basins Engineering hydraulic calculation procedures suggest flood flows were 2-3 m deep on steep gradients (0 008-0 01) Discusses geology, climate, vegetation, and soils, terrace development and stratigraphy, and includes surface profiles, grain size distribution, and cross section of Ralston Creek

Barrett, J.K., and Pearl, R.H., 1976, Hydrogeological Data of Thermal Springs and Wells in Colorado, CO State Geological Survey Information Series 6, 124 p., 2 figs., 3 tables. Sources USGS Library (271)C 3is, CO Geol. Srv. distributes $8.

Lists locations of all thermal springs and wells with field measurements of temperature, discharge, specific conductance, pH, chemical, and spectrographic analyses of dissolved mineral matter, and associated radioactivity in the thermal waters Two wells are located between Boulder and Jefferson Counties, Eldorado Springs-Spring A and Eldorado Springs-Spring B, both in T 1 S, R 71 W

Bass, N.W., and Cashion, W.B., 1951, Coal in the Rocky Flats Site, Townships 1 and 2 S., R. 70 W., Boulder and Jefferson Counties, Colorado. Source: RFP Library.

Discusses the coal found in the Rocky Flats Site Townships 1 and 2 S, R 70 W that lie within the Northern coal field, whose coal beds are within the basal 200 ft. of the Laramie formation of Upper Cretaceous age Explains coal and coal beds and mine in the area Indicates area discussed should be classed as coal land and contains minable coal at moderate depth Amount of coal approximated at 30 million, more or less, tons of coal, however, to better ascertain the amount it is recommended in report that several core holes be bored to establish the thickness

Benedict, J.B., 1966, Radiocarbon Dates from a Stone-Banked Terrace in the Colorado Rocky Mountains, USA, Geografiska Annaler A, vol. 48A, no. 1, p. 24-31. Source: USGS Library S(583) 629.

Excavation of the Niwot Ridge terrace (about 24 km west of Boulder) on the eastern flank of the Front Range to study the down-slope movement of soils Conducted soil profile and radiocarbon dating and correlated these with the age of the terrace, past movement rates, and climate

Berg, R.R., 1962, Subsurface Interpretation of the Golden Fault at Soda Lakes, Jefferson County, Colorado, American Association of Petroleum Geologists Bulletin 46, no. 5, p. 704-707, p. 2019. Source: USGS Library G(200) Am3.

Description of the Golden Fault and Soda Lakes area.

Bieber, David W., 1983, Gravimetric Evidence for Thrusting and Hydrocarbon Potential of the East Flank of the Front Range, Colorado, Rocky Mountain Association of Geologists, p. 245-255. Source: CSM Library.

Article discusses the portion of the Front Range uplift between Boulder and Perry Park, Colorado Indicates that this portion appears from gravity data to be bounded by reverse faults dipping to the west at angles less than 60 degrees. Describes the geometry of the Front Range Thrust and gives an explanation on the gravity interpretations Four Bouquer gravity profiles and generalized cross sections are illustrated in the report Concludes that there is potential for accumulation of commercial quantities of hydrocarbons

Bilodeau, S.W., Van Buskirk, D., and Bilodeau, W.L., 1988, Geology of Boulder, Colorado, USA, CO Geol. Survey MI 29, 37 p., 23 figs. Source: USGS Library 403(271) C71M, CO Geol. Srv. distributes $7.

Study addresses geologic and hydrogeologic hazards in Boulder for the purpose of identifying and quantifying the hazards and implementing governmental regulation to discourage irresponsible land use Discusses the geologic setting including bedrock geology, geologic history, seismicity, and seven types of surficial deposits-glacial and periglacial, residual regolith, pediment and terrace alluvium, slope wash colluvium, talus and landslide, valley fill alluvium, and eolian Covers the economic deposits of sand and gravel, clay minerals, limestone and cement, fluorspar, stone, silica sand, coal, loam and peat, oil and gas, geothermal resources, and metallic minerals. Geologic constraints discussed include expansive soil, floods, hydrocompaction, mass movements, mine subsidence and mine fires, and shallow ground water

Bird, A.G., 1956, Primary Pitchblende Deposits at the Ralston Creek Mine, Uranium, vol. 3, no. 8, p. 8. Source: USGS Library.

Article explaining the existence of rich, isolated, uranium deposits through geologic evidence in the Ralston Creek Mine Surface and underground geologic mapping indicate that several factors play a part in the formation of the vein type uranium deposits in the mine Explains how the character of the wall rock and the anticlinal fold help establish these deposits Indicates ferrous iron present will act as reducing agent and cause the precipitation of primary pitchblende from uranium bearing solutions Author also explains his belief that a structural trap is needed to aid in the chemical reactions to take place States a similar condition exists at the Ladwig Mine, a few miles south

Bird, A.G., 1957, Uranium Deposits in the Golden Gate Canyon and Ralston Creek Area, Jefferson County, Colorado, Mines Magazine, vol. 47, no. 3, p. 91-93. Source: USGS Library S(271) C81

Report on four currently producing uranium mines in an area about four miles northwest of Golden The mines are Ralston Creek or Schwartzwalder, Ladwig, Ascension, and Mena All are located in Precambrian schists and gneisses of the Idaho Springs Formation Primary pitchblende occurs in flat and steeply dipping veins and all mineralization in the veins appears to be genetically related to larger northwesterly trending Laramide faults, known locally as breccia reefs Uranium is the primary mineral in all of these deposits Illustrated

Bird, A.G., 1979, An Epigenetic Model for the Formation of Schwartzwalder Uranium Deposit, Economic Geology, vol. 74, no. 4, p. 947-948. Source: USGS Library G(200) Ec74.

States that the ores in the Schwartzwalder mine are true hydrothermal deposits The temperature at the time of formation was relatively low in a highly alkaline environment. The veins have gone through at least ten periods of deformation and recementation, each followed by the introduction of typically hydrothermal minerals Most of the known uranium occurrences in Colorado are located just off to the side of the mineral belt

Birdsall, E.F., 1956, A Seismic and Gravimetric Study of the Golden Fault Near Golden, Colorado, CSM Thesis T-804. Source: CSM Library Front Desk.

Describes seismic studies for determination of sediment thickness and displacement due to overthrusting Includes gravity survey

Birkeland, P.W., Crandell, D.R., and Richmond, G.M., 1971, Status of Correlation of Quaternary Stratigraphic Units in the Western Conterminous United States, Quaternary Research, vol 1, no 2, p. 208-220. Source: USGS Library 352 Q28r.

Study of deposits of Quaternary age from the Rocky Mountains to the Pacific Coast including the Colorado Piedmont Alluviums. The deposits include those of continental and alpine glaciers, glacial meltwater streams, nonglacial streams, pluvial lakes, marine environments, eolian environments, and mass-wasting environments Charts correlate representative sequences of deposits of many of these environments Covers stratigraphic sequence, soil characteristics, amount of subsequent erosion and interlayered volcanic ash beds, radiocarbon dates, and rock magnetism

Blume, John A. & Associates, 1972 (r 1974), Seismic and Geologic Investigations and Design Criteria for Rocky Flats Plutonium Recovery and Waste Treatment Facility, Prepared for C.F. Braun and Company, Alhambra, California, C.F. Braun & Co., Engineers, JABE-CFB-01, 65 p. Source: RFP Library.

Report on the results of seismological and geological investigations performed at the Rocky Flats Plant Includes recommended seismic design criteria References, tables, figures, and appendices accompany report

Boos, C.M., and Boos, M.F., 1957, Tectonics of the Eastern Flank and Foothills of the Front Range, Colorado, American Association of Petroleum Geologists Bulletin, vol. 41, no. 12, p. 2603-2676. Source: USGS Library G(200) Am3.

Study of Front Range topography, general and Precambrian geology, and sedimentary formations of the foothills belt Discusses Boulder and the Denver Mountain Parks and tectonic units of the Golden Fault.

Boos, M.F., 1964, Distribution of Graphite in Black Silexite and Calcite-Rich Precambrian Strata, Front Range West of Denver, Colorado [abs.], Geologic Society of America Special Paper 76, p. 191-192. Source: USGS Library G(200)G 29sp.

Discusses the distribution of graphite in black silexite and calcite-rich Precambrian strata

Boos, M.F., and Boos, C.M., 1934, Granites of the Front Range--the Longs Peak-St. Vrain Batholith, Geologic Society of America Bulletin, vol. 45, no. 2, p. 303-332, pl. 25-33, 6 figs. Source: USGS Library G(200) G29.

Describes the Longs Peak-St. Vrain batholith as a compound granite mass of Precambrian age which intrudes highly metamorphosed schists and gneisses, mostly of sedimentary origin, with local lime silicate rocks probably of igneous rocks To the east, the Coal Creek and Ralston Formations have been identified as sedimentary in origin The oldest observed intrusive rock is a gray granite and gneissoid granite that crops out widely on Boulder Creek, known as the Boulder Creek granite-gneiss The gray granite intrudes the Coal Creek quartzite, the Ralston Formation, and the schist on the northern and western border of the Boulder region

Brady, Lawrence, L., 1969, Stratigraphy and Petrology of the Morrison Formation (Jurassic) of the Canon City, Colorado, Area, Journal of Sedimentary Petrology, v. 39, no. 2, p. 632-648. Source. CSM Library.

Study of the Morrison Formation in areas North and West of Canon City The Morrison Formation is one of the most widespread of continental deposits and in this area the formation crops out along hogback and escarpment slopes Research was undertaken to establish provenance, method of transport, and environment of deposition of the rocks Described is the stratigraphy and stratigraphic relations of the region and in the Morrison Formation in the Canon City Area Its thickness, petrology, texture and composition, claystones and carbonate rocks are detailed Conclusion summarizes information into 13 points

Bredehoeft, J.D., 1976, Hydraulic Fracturing to Determine the Regional In-Situ Stress Field, Piceance Basin, Colorado, Geologic Society of America Bulletin, vol. 87, p. 250-258. Source: ESCI Library- CU.

A field investigation of regional insitu stress, preformed in the Piceance Oil Shale Basin, to determine the state of stress within the Earth when using the techniques of hydraulic fracturing Induced fractures were noted for their strike and dip The fractures induced at hydraulic pressures were found to be oriented the same as the normal faulting in the basin The depth and position of the fracturing indicates that hydraulic fracturing experiments gives meaningful measurements of the tectonic state of stress Included in report is a summary of hydraulic fracturing experiments, comparison studies, stress direction, measurement figures, and records of pressure versus time during fracturing experiment

Brown, R.W., 1943, Cretaceous-Tertiary Boundary in the Denver Basin, Colorado, Geologic Society of America Bulletin, vol. 54, no. 1, p. 65-86, 2 pl., 1 fig. Source: USGS Library G(200) G29.

Proposal to change the nomenclature of the basal portion of the Denver Formation and Dawson arkose in the Upper Cretaceous sequence and other strata adjacent to the Cretaceous-Tertiary boundary Stratigraphy and paleontologic evidence shows that the Laramie and Arapahoe Formations and the Cretaceous parts of the Denver Formation and Dawson arkose comprise a unit correlative with the Lance Formation and its equivalents Redefines Laramie to include all the Upper Cretaceous sequence between the top of the Fox Hills and the base of the Paleocene in the Denver Basin, retains the term Arapahoe as Arapahoe conglomerate member for the conglomerate immediately overlying the present Laramie Formation, and restricts the terms Denver Formation and Dawson arkose to the Tertiary strata

CTL/Thompson, Inc., 1979, Supplemental Report Evaluation of Landslide Area Perimeter Security Zone, Stations 77+00 to 90+00, DOE Rocky Flats Plant, Golden, Colorado, Prepared for Richard Weingardt Assoc., Inc., Job No. 4436, 11 p.

SEE NOTE UNDER THOMPSON

Camacho, R., 1969, Stratigraphy of the Upper Pierre Shale, Fox Hills Sandstone and Lower Laramie Formation (Upper Cretaceous), Leyden Gulch Area, Jefferson County, Colorado, CSM Thesis T-1242, 84 p., 6 maps. Source: CSM Library Front Desk.

Study of stratigraphy in the Leyden Gulch area, six miles north of Golden, Colorado in T 2 S , R 70 W Four subsurface stratigraphic sections were correlated with the subsurface geology in the eastern part of the area. The lithology of the sandstones in the surface sections was related to sandstones found in gas injection wells and core hole lithologic logs The distribution of the coal seams mapped in the Leyden mine was related to coal occurrences exposed on the surface

Campbell, I.A., 1966, Stream Profiles and Pediments Near Boulder, Colorado, Mountain Geologist, vol. 3, no. 4, p. 171-179. Source: USGS Library G(200) M864, not avail. for purchase.

Graphical analysis of seven stream profiles in the Front Range between Boulder and Golden to determine the possibility of correlating stream nick points with pediments The Rocky Flats surface pediment is in the south-central part of this area.

Carpenter, R.H., 1976, Schwartzwalder Uranium Mine, Jefferson County, Colorado, In Studies in Colorado Field Geology, Epis, R.C., ed., CSM Prof. Contributions No. 8, p. 456-459. Source: USGS Library S(271)q C78pc.

Covers the generalized stratigraphy of Golden and includes a diagram illustrating the geological structure and its influence on Golden's topography

Chapin, Charles, E., and Cather, Steven, M., 1983, Eocene Tectonics and Sedimentation in the Colorado Plateau-Rocky Mountain Area, Rocky Mountain Association of Geologists, p.33-56. Source: CSM Library.

Report on the Colorado Plateau, specifically the Central and Southern Rocky Mountains during the late Cretaceous to Middle Cenozoic tectonic evolution. The method of analyzing structural patterns and timing integrated with a detailed examination of the sedimentary record yields a 2-stage model for the Laramide Its early Eocene culmination is focused Discussed is the Eocene tectonic framework of uplifts, basins, and wrench faults, the pros and cons of several models and a synthesized model, by the authors, into the existing plate tectonic framework. Maps, diagrams, photographs and cross sections accompany the text.

Chapman, J.J., 1948, Geology of Eastern Clear Creek-Golden Gate Canyon Area, Jefferson County, Colorado, CSM Thesis T-647. Source: CSM Library Front Desk.

Study of the structure and metamorphism of the Idaho Springs Formation Includes Precambrian stratigraphy Study area extends 25 miles from State Highway 93 to Indian Gulch and from Golden Gate Canyon to Clear Creek.

Chen and Associates, 1986, Review of Exisiting Exploratory Hole Data, Rocky Flats Plant, Golden, Colorado, Job no. 6 017 86, 15 p.

Files subpoenaed by FBI

Chen and Associates, 1978, Soil and Foundation Investigation for the Proposed B-5 Dam, Rocky Flats Plant, Golden, Colorado, Job no. 15,665-5, Prepared for McCall, Ellingson, and Morrill, Inc. Source: Included in publication of Woodward-Clyde Consultants, 1984, Job no. 21304-350.

Documents results of soil and foundation investigations for the proposed construction of the B-5 Dam on South Walnut Creek at the Rocky Flats Plant site Presents surface, subsoil, and bedrock conditions, laboratory test results and soil related design and construction recommendations

Coffman, J.L., and Von Hake, C.A., 1973, Earthquake History of the United States, U.S. DOC (NOAA), pub. 41-1, 208 p. (Reprinted 1982 with supplement, 1971-1980) Source: CU Library - Government Documents

A consolidated report of all prominent earthquakes in the U S from historical times through 1970 Categorized into natural seismic divisions, the document divides the U S into 9 regions each containing

a resume, a list of earthquakes all major, intermediate and minor, for the area Included are photos, maps, and charts

Covington, G., 1966, Stratigraphy and Sedimentary Structures in the Fox Hills Sandstone, Golden Area, Colorado, Mountain Geologist, vol. 3, no. 4, p. 161-169. Source: USGS Library G(200) M864, not avail. for purchase.

Study of two sections of the Upper Cretaceous Fox Hills sandstone near Golden Includes descriptions of stratigraphy and sedimentary structures

Cronable, J.M., 1977, Stratigraphy and Petroleum Potential of Dakota Group, North Park, Laramie, and Northwest Denver Basins, Wyoming and Colorado. Source: CSM Library.

Analysis of the stratigraphy and petroleum potential of the Lower Cretaceous Dakota Group The interval from the top of the Morrison Formation to the base of the Mowry Shale The study area occupies approximately 10,000 square miles The study interprets depositional environments, determines interbasin paleogeographies, and evaluates petroleum potential of the various genetic units of the Dakota Group.

Cross, W., 1889, The Denver Tertiary Formation, In Colorado Scientific Society Proceedings, vol. 3, pt. 1, p. 119-133. Source: USGS Library S(271) C86.

Discussion of the Denver Coal Basin which covers an area of about 400 miles The northern boundary extends from the northern bank of Clear Creek to the Platte, and from the southern bank of the Sand or Coal Creek to the Platte to a point about 15 miles southeast of Denver

Cruz, R. de la, and Raleigh, C.B., 1972, Absolute Stress Measurements at the Rangely Anticline, Northwestern Colorado, Int'l. Journal of Rock Mechanics Mining Science, vol. 9, p 625-634 Source: USGS Library 425 In83.

Compares five different methods of measuring absolute stress in rocks in situ Correlates surface stress distribution to the geologic features, such as location of measurement with respect to the anticline and existing jointing patterns

Dames and Moore, 1981, Final Report, Geologic and Seismologic Investigations for Rocky Flats Plant for U.S. Department of Energy, Volume I , Text 244 p., Job No. 10805-041-14, DOE Contract No. DE-AC04-80AL10890. Source: RFP and USGS Libraries, NTIS, Order# DE83006257, Price Codes-PC A13/MF A01.

Report on a comprehensive geologic and seismologic investigation of the Plant and vicinity Describes the regional geologic setting and the state of seismic activity for the Golden Fault, the graben, and the Plant. Documents historic research and current field and laboratory data pertaining to the 1882 earthquake

Dames and Moore, 1981, Final Report, Geologic and Seismologic Investigations for Rocky Flats Plant for U.S. Department of Energy, Volume II , Appendices 455 p., Job No. 10805-041-14, DOE Contract No. DE-AC04-80AL10890. Source: RFP and USGS Libraries, NTIS, Order# DE83006258, Price Codes-PC A24/MF A01.

Results of a seismic refraction study of the Ralston Reservoir area including soil stratigraphic investigations, unit descriptions, an analysis of geodetic data, experimental model, seismological evaluation, a seismicity survey of the northern Golden Fault, historical data for the 1882 earthquake, and a dendrochronology study

Dames and Moore, 1981, Final Report, Geologic and Seismologic Investigations for Rocky Flats Plant for U.S. Department of Energy, Volume III, Plates 207 p., Job No. 10805-041-14, DOE Contract No. DE-AC04-80AL10890. Source: RFP and USGS Libraries, NTIS, Order# DE83006309, Price Codes-PC A10/MF A01.

Contains geologic maps and cross sections for areas surrounding the Rocky Flats Plant

Davis, T.L, and Weimer, R.J., 1976, Late Cretaceous Growth Faulting, Denver Basin, Colorado, In Studies in Colorado Field Geology, CSM Prof. Contributions no. 8, p. 280-300. Source: USGS Library S(271) C78pc.

Interpretation of 250 miles of reflection seismic data in conjunction with surface maps and well data along the east flank of the Denver Basin to reveal two distinct types of Late Cretaceous faulting

Davis, T.L., 1974, Seismic Investigation of Late Cretaceous Faulting Along the East Flank of the Central Front Range, Colorado, CSM Thesis T-1681, 65 p., 7 plates. Source: CSM Library Front Desk.

Study of Late Cretaceous faulting over a 500 square mile area (T 2 S - T 2 N, R 67 W - R 70 W) to understand deltaic sedimentary growth faulting, Laramide crustal movement, and potential hydrocarbon accumulation within the Upper Cretaceous Includes seismic data, data file in Geophysics Department, time-structure mapping, velocity determination, depth mapping, geologic interpretation, and application to petroleum exploration References log data for 60 wells Provides log for well in T 1 N, R 69 W (Section 6), plates 1a and 1b

Davis, T.L., 1976, Rocky Flats Reflection Seismic Project: In Final EIS to ERDA 1545-D, Rocky Flats Plant Site, Golden, Jefferson County, Colorado, April 1980, vol. 2 of 3, fig. 16. Source: RFP Library.

Results of investigation to determine the possible existence of faults at Rocky Flats Interpreted 15 miles of seismic reflection data in the general vicinity of Rocky Flats and Eggleston Reservoir north of Highway 128 Three conclusions were drawn two distinct but associated fault systems exist, a basement controlled graben area to the north and associated penecontemporaneous growth faulting exists in this graben area, the Plant is located on the stable, upthrown, horst block south of the graben area, and no faults exist within the immediate area of the Plant. Includes tectonic, structure contour, and seismic maps, stratigraphic column, synthetic seismogram, and seismic data

Davis, T.L., and Young, T.K., 1977, Seismic Investigation of the Colorado Front Range Zone of Flank Deformation Immediately North of Golden, Colorado, Rocky Mtn. Assoc. of Geol., 1977 Symposium. Source: USGS Library G(271) R59f, not avail. for purchase.

Interpretation of 40 miles of reflection seismic data in conjunction with surface maps and well data Includes zone of flank deformation and seismic investigation

Davis, T.L., 1985, Seismic Evidence of Tectonic Influence on Development of Cretaceous Listric Normal Faults, Boulder-Wattenberg-Greeley Area, Denver Basin, Colorado, Mountain Geologist, vol. 22, no. 2. Source: USGS Library G(200)M 864, RMAG distributes $8.

Discusses Normal Listric Faults in the Boulder area and the Greeley, Wattenberg, and Hambert Field

Derzay, R.C., and Bird, A.G., 1976, Economic Geology of Uranium Deposits in Ralston Creek Area, Jefferson County, Colorado, (Rep No. RME-1077). Source: CU Library-Government Documents

Document describes uranium deposits in Golden Gate Canyon and the Ralston Creek drainage area near Denver, Colorado Discusses Ralston Creek Mine, North Star Mine, Gary Mine, engineering data and mining operations The uranium deposits in Ralston Buttes may be classed among the largest hydrothermal uranium bearing vein deposits in metasedimentary rocks in the U S Its origin and the ore controls of these deposits are studied in depth Illustrations include geologic sections of Ralston Creek Diamond Drill, structural and geologic map, and geologic plan

Dickinson, William R., 1976, Sedimentary Basins Developed During Evolution of Mesozoic-Cenozoic Arc-trench System in Western North America, Canadian Journal of Earth Science, vol. 13, 1268-1287. Source: CSM Library.

Describes the development of the Mesozoic and Cenozoic sedimentary basins in western North America The Cordilleran margin is a complex tectonic system which has in the past included a variety of tectonic elements Progressive broadening of this tectonic system was produced by accretion of oceanic elements to the edge of the continental block and by peeling of cover off rigid basement underthrust behind the arc along the edge of a zone of ductile lithosphere formed thermally beneath the arc An initial Jurassic island arc evolved through the Cretaceous into a terrestrial Tertiary arc as subsiding forearc and retroarc basins were filled with sediment.

Dobrovolny, E., and Gard, L.M., 1953, Report on the Geology of the Relocation Alignment Between Marshall, Colorado and the Rocky Flats Atomic Energy Commission Plant, State Highway No 93, USGS Open-File Rpt. 53-400. Source: USGS Library (200) R290, Distribution.

Reports on the geology of the Pierre shale, Fox Hills sandstone, Laramie Formation, and late Tertiary or early Pleistocene deposits Includes a geological column compiled from sections measured on and adjacent to the center-line of the proposed relocation

ERDA, 1980, Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, Jefferson County, Colorado, DOE/EIS-0064 (ERDA 1545-D), volume 1 of 3, p. 2-16 to 2-56. Source: RFP Library.

Discusses the geology and seismology of the Rocky Flats Plant including the physiography and geomorphology and geologic history, stratigraphy, soils, mineral resources, regional tectonic setting, history of seismographic stations in Colorado, 1882 earthquake, and the hydrology of the surface-water, aquifers, and infiltrating ground-water

Eardley, A.J., 1968, Major Structures of the Rocky Mountains of Colorado and Utah; A Coast to Coast Tectonic Study of the United States, Univ. of MO at Rolla Jour., no. 1, p. 79-99. Source: ESCI Library- CU.

This paper discusses the major structures of Colorado and Utah and offers a theory of origin It proposes that the Ancestral Rockies, the ones of Cretaceous and early Tertiary age of the shelf of Colorado and Eastern Utah are the result of vertical uplifts of silicic crust. The paper discusses the Crustal movements and deformation, basin and range faulting, theory of primary uplifts, Colorado and Utah shelf structures, nature of border thrusts, fracture patterns in the shelf and the deep seated cause of uplifts Included are graphs, charts, and maps

Earthquake Info. Bull., 1970, Earthquake History of Colorado, Earthquake Information Bulletin, vol. 2, no. 6, p. 24-27. Source: USGS Library 240(200) Un3eib.

Reports that Colorado is a region of minor earthquake activity and that historically most of the shocks have centered to the west of the Rocky Mountain Front Range However, the 1882 earthquake north of Denver probably centered in the Boulder area and was assigned an intensity of VI by the NEIC The intensity of earthquakes recorded dropped after the Rocky Mountain Arsenal slowly removed waste fluid from the ground where it had been injected

Eldridge, G.H., 1889, On Some Stratigraphical and Structural Features of the Country above Denver, Colorado, In Colorado Scientific Society Proceedings, vol. 3, pt. 1, p. 86-118. Source: USGS Library S(271) C86.

Study on a region within a 25 mile radius of Denver to explore the interdependence of topography and geology, historical characteristics of the formations, the stratigraphical relations of the tertiary group to each other, and to the cretaceous--as instanced by the numerous unconformities, certain regions of remarkable nonconformity--as at Golden and Boulder, the systems of faults, and the general features of the coal fields and their coals Accompanies a report by W Cross, The Denver Tertiary Formation, p 119-133

Emmons, S.F., Cross, W., and Eldridge, G.H., 1896, Geology of the Denver Basin in Colorado, USGS Monograph 27, 556 p. Source: USGS Library R(200)c, not avail. for purchase.

Report on the region between Golden and Boulder discusses physiography, historical geology, structural geology, hydrography, paleontology, and coal regions Includes sections on the post-Laramie and Tertiary geology and the Arapahoe and Denver Formations

Empire Laboratories, Inc., 1974, Report of a Soils and Foundation Investigation for Backwash Storage Tanks, Building 124 Rocky Flats Plant, South of Boulder, Colorado, Prepared for Bruns, Inc., 6 p. Source: RFP Library.

Results of soils and foundation investigation for the proposed backwash storage tanks located east of the west gate at the Rocky Flats Plant. Six test borings were made to determine soil conditions Report includes site location and description, description of soil and groundwater conditions and recommendations based on data. Conditions were found to be silty topsoil and gravel surfacing with clayey sand, gravel and cobbles under the topsoil. Report details recommendations Included with report is test boring location plan, key to borings, log of borings, consolidation test data, and summary of test results Appendix A suggest specifications for placement of compacted earth fills and/or backfills

Engineering-Science, Inc., 1975, A Supplementary Report to an Engineering Study for Water Control and Recycle Concerning the Recovery of Nitrate Laden Ground-Water, Contract AT(29-2)-3413. Source: RFP Library.

Evaluation and recommendations concerning problem of nitrate salts which are being transported from the area of the 207 Solar Evaporation Ponds into North Walnut Creek Report includes problem description, problem analysis, 3 control alternatives and recommendations Study of the groundwater contamination in the area of the Solar Evaporation Ponds was used to determine what must be accomplished to solve the contamination problem Included are test hole locations, nitrate concentrations, location and depths of permeable lens, areas of significant nitrate concentration, proposed location of collection trenches, and a series of plans and profiles

Evans, D.M., 1970, The Denver Area Earthquakes and the Rocky Mountain Arsenal Disposal Well, In Engineering Seismology-The Works of Man, Engineering Geology Case Histories 8, p 25-32. Source: USGS Library G(200)q G292e.

Study of the relationship between waste water injection into the Rocky Mountain Arsenal well and the Denver area earthquakes Includes regional geology of the Arsenal area northeast of Denver

Fenneman, N.M., 1905, Geology of the Boulder District, Colorado, USGS Bulletin 265, 98 p. Source: USGS Library (200)M, not avail. for purchase.

Describes the physiography, stratigraphy, structure, and geologic history of the Boulder District for the purpose of finding petroleum Includes topographic and geologic maps, cross sections, and location of oil wells Report area is a rectangle, 16 miles north and south by 9 miles east and west. The northern limit is Table Mesa, eastern limit is Gunbarrel Hill, western limit is the stratified-rock foothills, southern limit is Marshall

Ferris, C.S., and Bennett, N., 1977, Geochemical Prospecting at Ladwig Uranium Mine, Near Golden, Colorado, [abst.], USGS Circular No. 753, p. 66-68. Source: CSM Library.

Report describes the Ladwig Uranium mine It is located approximately 4 8 km Northwest of Golden in the Colorado Front Range Discusses its origin and the principle rocks found In 1967 a radiometric and soil geochemical survey found further anomalies Discusses soil samples that were taken and analyzed for molybdenum, a known associate of pitchblende in Front Range vein uranium deposits Process indicates that detailed soil sampling for molybdenum is a valuable supplement to radioactivity in locating pitchblende veins

Fieldner, A.C., Cooper, H.M., and Abernathy, R.F., 1937, Analysis of Colorado Coals, In Analysis of Colorado Coals, U.S. Bur. Mines Tech. Paper 574, p. 47-131. Source: CU Library

Documents the analysis of mine samples Grouped by. proximate analysis- moisture, volatile matter, fixed carbon and ash, ultimate analysis-sulphur, hydrogen, carbon, nitrogen, oxygen, and ash, Calorific value or heat of combustion and softening temperature of ash when such determinations were made An explanation is given on the differences in volatile-matter and fixed carbon determinations Included is a table that lists all the data which is comprised of analyses taken from publications of the Bureau of Mines prior to 1936 The methods of analysis used were developed by the Bureau of Mines Pages 50-131 contains the complete table of the analyses of the mine samples

Fogarty, C.F., 1952, Subsurface Geology of the Denver Basin, CSM Thesis T-755, four microfiche sheets covering 204 p., 7 plates contained in separate Appendix C-2. Source: CSM Library Front Desk.

Study to evaluate petroleum possibilities of the Denver Basin within the confines of eastern Colorado, western Kansas and Nebraska, and southeastern Wyoming covering about 100,000 square miles between T 26 S to T 30 N, R 35 W to R 70 W A well-known source of oil, gas, and bitumen is Ralston Creek, a bituminous sandstone of Dakota age Describes the Arapahoe (Upper Cretaceous)-Denver (Lower Tertiary) Formation as from 70 to 1,050 feet thick, thinning in all directions from area of outcrop It is present in east-central Colorado east of the Front Range within T 15 S to T 2 N, R 59 W to the Front Range and consists of andesitic, fine-grained sandstones, graywackes, greenish and drab clays, buff to brown interbedded silty clays, mudstones, lignite shales and some lignite

Gable, D.J., 1986, Provenance and Metamorphism of Early Proterozoic Rocks of the Central Front Range, Colorado, Abstracts with Programs--Geological Society of America, USGS Outside Publication No. 1650, vol. 18, no. 6, p. 607. Source:

Discusses the east-west trends of metamorphic rocks in the Central Front Range

Goddard, E.N., 1938, Geologic Map of the Front Range Mineral Belt, Colorado (Explanatory Text), Colorado Science Society Proceedings, vol. 14, no. 1, p. 3-48. Source: USGS Library S(271) C86.

Correlates the influence of Precambrian rock type and structure on the major Laramide structural features, which in turn, influenced the distribution of ore deposits The Dakota quartzite is present on the east and west slopes of the Front Range The interbedded shale in the Dakota is gray to black and contains no clastic mica Some of the light gray shales make excellent fire clay and have been mined extensively in the region north and south of Golden

Greengard, T.C., 1984, History and Status of RCRA Ground Water Monitoring Program: Rockwell International Internal Letter. Source: RFP Library.

Letter discusses the groundwater monitoring program The RCRA monitoring wells are stated as the ones down gradient from the solar ponds, about 17 are listed for monitoring purposes States when sampling occurred and what was found as a result Well samples were analyzed for the RCRA parameters in 1982 and 1983 and for the EPA drinking water parameters in 1984

Gries, Robbie, 1983, North-South Compression of Rocky Mountian Foreland Structures, Rocky Mountain Association of Geologists, p. 9-32.

Discusses the developement of the foreland uplift structures and adjacent basins due to horizontal displacement on the east-west-trending thrusts and the north-south shortening on east-west structures

Grose, L.T., 1972, Tectonics in Geologic Atlas of the Rocky Mountain Region, W.W. Mallory (ed.), Rocky Mtn. Assoc. of Geol., p. 35-44. Source: ESCI Library- CU.

Discusses the Phanerozoic tectonic data of the Rocky Mountain Region Article includes discussion of major Phanerozoic tectonic units, age relationships, the bordering tectonic regions, faulting types and patterns, folding types and patterns, and an interpretation of Tectogenesis of the region Accompanying text are maps, structural cross sections and photographs

Gude, J.A. III, 1950, Clay Minerals of the Laramie Formation, Golden, Colorado, Identified by X-Ray Diffraction, American Association of Petroleum Geologists Bulletin, vol. 34, no. 8, p. 1699-1717. Source: USGS Library G(200) Am3.

Study of the mineralogical and lithological distribution and association of clay minerals by the X-ray diffraction powder method. A complete section across the Upper Cretaceous Laramie Formation was mapped, measured, and sampled in detail

Gude, J.A. III, and McKeown, F.A., 1952, Results of Exploration at the Old Leyden Coal Mine, Jefferson County, Colorado, USGS TEM Rpt. 292, 14 p. Source: USGS Library, USGS distributes microfiche $4.

Report on drillings at the Old Leyden Coal Mine to explore the lateral and downward extent of a uranium-bearing coal and the associated carnotite deposits in the adjacent sandstone Data helps to explain the geology and structural control of deposit. Explains process used for drilling, logging and sampling Describes geology, and results of diamond drilling Text accompanied with maps, sections, and illustrations of the various diamond drill holes

Hall, D.C., and Johnson, C.J., 1979, Drinking-Water Quality and Variations in Water Levels in the Fractured Crystalline-Rock Aquifer, West Central Jefferson County, USGS Water Resource Investigation No. PB-80 128 580 (WRI 79-94), 57 p. Source: USGS Library (200)WRI, NTIS Distribution.

Analysis of water-quality data from 26 wells located in small urbanized areas between Golden and the Arapahoe National Forest. Most of the wells are located between Evergreen and Conifer Twenty-one wells contained excessive concentrations of major chemicals, bacteria, trace elements, or radiochemicals

Hall, D.C., Hillier, D.C., Cain, D.C., and Boyd, E.L., 1980, Water Resources of Boulder County, Colorado, CO Geological Survey Bulletin 42, 97 p., 19 figs., 23 tables, 1 pl. Source: USGS Library, CO Geol. Survey Distributes $8.

Discusses groundwater availability Includes maps of well and spring locations for which water-quality data are available, and identifies location of aquifers

Hall, R.D., 1966, Heavy Minerals in Recent Alluvium Along the Eastern Flank of the Front Range, Golden to Colorado-Wyoming Line, Univ. of CO Thesis T-1953. Source: Univ. of CO P651 s C.1.

Study focuses on heavy minerals in Recent Alluvium along the east flank of the Front Range bounded by Clear Creek on the south and the Colorado-Wyoming border on the north Discusses the drainage systems of Cache la Poudre, Big Thompson, St. Vrain, Boulder Creek, and Clear Creek and their corresponding bedrock geology. Includes heavy metal assemblages of each system and comparison with late Paleozoic sandstones

Hampton, O.W., 1957, Structural Geology of the Foothills Region from Plainview to Golden, Univ. of CO Thesis T-1957. Source: Univ. of CO H189 s C.1.

Discusses the area in the foothills zone between Golden and the Boulder County-Jefferson County line, T 2 S to T. 3 S, R 70 W to R. 71 W Provides an areal geologic map, delineation of geologic structures, and an outline of the tectonic history of the eastern flank of the Front Range Describes the relationship of local structural features to the regional features of the Front Range Includes stratigraphy and lithology of the Arapahoe-Denver Formation, the Green Mountain conglomerate, and Tertiary igneous rocks, and the structural geology and genesis of the regional setting, sedimentary rocks, and faults

Hampton, O.W., 1958, Bedrock Creep North of Golden, Colorado [abs.], Geologic Society of America Bulletin, vol. 69, no. 12, Part 2, 1727 p. Source: USGS Library G(200) G29.

Explains that deformation of bedrock caused by creep is common in the area north of Golden and failure to recognize it may have resulted in misinterpretations of structures The bedrock creep of the Fox Hills and Laramie on the flanks of Leyden Ridge has so flattened the dips that the contrast with the vertical ridge-forming unit has caused an erroneous impression of faulting

Hamzawi, A.T., 1966, Gravity Survey of Denver-Golden Area, Colorado, CSM Thesis T-1040, 144 p., 3 maps. Source: CSM Library Front Desk.

Details construction of a Bouguer anomaly map for a 900 square mile area extending from Deer Creek on the south to Boulder on the north, including an eastern segment of the crystalline core of the Front Range and foothills, and a western segment of the Denver Basin Describes the stratigraphy of the Upper Cretaceous formations, structural geology of the thrust faults and folds, and geologic history, and provides gravity data by station

Hansen, W.R., 1982, Environmental Geology of the Front Range Urban Corridor and Vicinity, Colorado, USGS, Reston (sold by GPO). Source: USGS Library.

Report gives general and nonspecific summary of the results of U S Geologic Survey activities in the Front Range Urban Corridor area during the last decade Report intended to call attention to basic data more so than answer questions Includes numerous literature citations for further investigation of specific topics Text accompanied with illustrations, photographs, and charts

Harms, J.C., 1961, Laramide Faults and Stress Distribution in Front Range, Colorado [abs], In abstracts of the 46th Annual Meeting in Denver, April 24-27, 1961, American Association of Petroleum Geologists Bulletin, vol. 45, no. 3, p. 413-414. Source: USGS Library G(200) Am3

Analysis of the Front Range faults with discussion of fault origins

Harms, J C., 1964, Structural History of the Southern Front Range, Mountain Geologist, vol 1, no 3, p. 93-101. Source: USGS Library G(200)M 864, not avail. for purchase.

Discusses early and late Paleozoic history, mesozoic, and Laramide history, and the nature of Laramide deformation

Hart, S.S., 1974, Potentially Swelling Soil and Rock in the Front Range Urban Corridor, Colorado, CO Geol. Survey Envrnt'l. Geol. 7, 23 p. 13 figs., 1 table, 4 apps., 4 pls. Source: USGS Library (271) C3eg, CO Geol. Survey Distributes $10.

Details potential hazard areas in the urban corridor in the Pierre shale, Laramie, Dawson, and the Denver-Arapahoe Formations

Hatton, T., and Turney, J.E., 1985, Annotated Bibliography of Subsidence Studies over Abandoned Coal Mines in Colorado (for Five Front Range Counties), CO Geol. Survey Info. Series 22, 95 p , 5 figs. Source: CO Geol. Srv., CO Geol. Survey Distributes free in office.

Bibliography of data on coal mine subsidence studies for the counties of Boulder, Weld, El Paso, Fremont, and Jefferson to be used to facilitate further study of undermined areas subject to increased development. Specific mine investigation studies were obtained from private consultants and public sources Bibliography consists of three parts--annotated bibliography, selected references, and sources of information

Haun, J.D., 1968, Structural Geology of the Denver Basin--Regional Setting of the Denver Earthquakes, CSM Quart., vol 63, no. 1, p. 101-112. Source: USGS Library S(271) C78.

Discusses the northeasterly orientation of basement faults and folds in the region north of the Rocky Mountain Arsenal which conform approximately with the surface faulting mapped in the Louisville area (T 1 S, R 70 W)

Healy, J.H., Rubey, W.W., Griggs, D.T., and Raleigh, C.B., 1968, The Denver Earthquakes, Science, vol. 161, no. 3848, p. 1301-1310. Source: USGS Library S(200) Sci22.

Statistically correlates the disposal of waste fluids into a deep well by the Rocky Mountain Arsenal with the occurrence of earthquakes near Denver

Heaton, R.L., 1939, Contribution to Jurassic Stratigraphy of Rocky Mountain Region, American Association of Petroleum Geologists Bulletin, vol. 23, p. 1153-1177. Source: USGS Library G(200) Am3.

Result of measuring 75 sections of the Jurassic beds along the eastern flank of the Rocky Mountains Includes cross-sections

Hillier, D.E., Schneider, P.A., Jr., and Hutchinson, E.C., 1979, Hydrologic Data for Water-Table Aquifers in the Greater Denver Area, Front Range Urban Corridor, USGS Open-File Rpt. 79-214, 83 p. Source: USGS Library (200) R290, USGS distributes $14.25.

Provides hydrologic data for water-table aquifers in the greater Denver area collected and compiled during 1976-1977 Consists of records for 325 wells and 11 springs and chemical analyses of the water for 272 of the wells and all of the springs

Hoblitt, R., and Larson, E., 1975, Paleomagnetic and Geochronologic Data Bearing on the Structural Evolution of the Northeastern Margin of the Front Range, Colorado, Geologic Society of America Bulletin, vol. 86, p. 237-242, 4 figs. Source: USGS Library G(200) G29.

Comparison of the remanent magnetic directions of emplaced igneous bodies with their unrotated magnetic reference directions indicates that the intrusive rocks and the enclosing Paleozoic and Mesozoic sedimentary rocks have undergone variable amounts of rotation, depending on their geographic location The host beds of the Ralston intrusive near Golden were rotated to their present attitude after the emplacement of the intrusive, whereas the enclosing sedimentary rocks at three sites near Boulder were rotated in part prior to and in part after intrusion Covers solid earth geophysics, paleomagnetism, geochronology, and petrochemistry

Hoffman, N.D., 1984, Nonradioactive Groundwater Data Summary, 1975-1983, Rockwell International. Source: RFP Library.

Report summarizes selective nonradiological data and trend evaluation on the monitoring wells from 1975 through 1983 States approximately 50 non-radiological parameters are analyzed on groundwater samples each quarter Included in report are drinking water parameters, nitrate and selenium, groundwater quality parameters, groundwater contamination parameters, conclusions and recommendations Appendices include graphs on nitrate concentration in monitoring wells, TDS (total dissolved solids) concentrations in monitoring wells, and conductivity in monitoring wells Figures in report include locations of groundwater monitoring wells at Rocky Flats, ranges of nitrate, TDS and conductivity concentrations in monitoring wells, nitrate, selenium, manganese and iron concentrations above drinking water standard, high TDS and conductivity wells Tables include drinking water parameters data for monitoring well, nitrate, TDS, and conductivity data summary

Hofstra, W.E., and Hall, D.C., 1975, Basic Data 36, Hydrogeologic and Water-Quality Data in Western Jefferson County, Colorado, CO Geol. Survey MI 11, 51 p., 2 figs., 12 tables (accom. CGS Bull 36). Source: USGS Library, not avail. for purchase.

Discusses an area of 300 square miles in the mountainous parts of Jefferson County cornered by Clear Creek, Pike National Forest, the Front Range, and the western boundary of Jefferson County Studies water availability and water-quality problems associated with sewage disposal

Hofstra, W.E., and Hall, D.C., 1975, Geologic Control of Supply and Quality of Water in the Mountainous Part of Jefferson County, Colorado [with abs.], CO Geol. Survey Bulletin 36, 51 p , 42 figs., 8 tables. Source: USGS Library, CO Geol. Survey distributes $4.

Study indicates that water-quality problems are related to geology and hydrology of the mountain environment. Contains geologic and hydrologic descriptions for Jefferson County

Horner, W.P., 1954, The Fox Hills-Laramie Contact in the Denver Basin, Univ. of CO Thesis, 62 p. Source: Univ. of CO Library.

Study of the Fox Hills and Laramie Formations in six major outcrops between Golden and Milliken, Colorado The Formations are described by textures, structures, and compositions, and further defined and separated by deposition, provenance of material, agents of transportation, and other forces acting on the sediments In the southern part of the area, the Laramie differs from the Fox Hills by having more detrital quartz, chert, and clay, and less feldspar The bedding of the Laramie is thinner and more variable, the grains have a slightly closer correlation between size and roundness Two of the outcrops studied occur near Boulder--the Denver and Rio Grande West Railroad cut (S E 1/4 sec 21, T 2 S , R 70 W) and the Marshall, Belmont Bluff (S.E 1/4 N E 1/4 sec 21, T 1 S , R 70 W)

Hseih, P.A., and Bredehoeft, J.D., 1981, A Reservoir Analysis of the Denver Earthquakes, A Case of Induced Seismicity, Journal of Geophysical Research, vol. 86, no. B2, p. 903-920. Source USGS Library.

Discusses earthquakes detected in the Denver area following the injection of waste fluids into a fractured reservoir in Precambrian bedrock below the Rocky Mountain Arsenal between 1962 and 1966 Covers the Precambrian reservoir, idealized models for the reservoir, model identification and

calibration, seismic data, comparison of earthquake and reservoir pressure, earthquake mechanism, and effect of high pressure on reservoir transmissivity Includes cross section of reported earthquakes, Precambrian structural contour map of the Denver Basin with the semi-infinite strip reservoir indicated

Hunt, C.B., 1954, Pleistocene and Recent Deposits in the Denver Area, Colorado, USGS Bulletin 996-C, p. 91-140. Source: USGS Library (200)M, USGS distributes $2.75.

Discusses stratigraphy in the Denver area from the Pleistocene to the Recent age and illustrates the close relationship between physical geology, paleontology, archeology, and soils

Hunter, M., 1949, Geologic Patterns in the Foothills of the Front Range, Boulder-Lyons Area, Colorado, Univ. of CO Thesis. Source: Univ. of CO Earth Science Library 3.

Study of an area adjacent to Boulder and Lyons at 105*10' west longitude and 105*20' west latitude Covers the stratigraphy of the Idaho Springs Formation, Coal Creek series, Boulder Creek quartz monzonite, and Silver Plume granite, the sediments of the Fountain, Ingleside, Lykins, Jelm, Dr Bond, Morrison, Dakota, Colorado group, Frontier, Montana group, and Laramie Formation Discusses geologic chronology and regional structure

Hurr, R.T., 1976, Hydrology of a Nuclear-Processing Plant Site, Rocky Flats, Jefferson County, Colorado, USGS Open-File Report 76-268, 68 p.. Source: USGS, RFP, CSM, and USGS (200) R290 Libraries, USGS distributes $21.75.

Reports on the potential impact of plant operations on the surface-water and ground-water hydrology of the plant and vicinity Assesses the distribution of contaminants as they move spatially and temporally through the hydrologic system Data complements earlier reports with geologic mapping, test drilling, surface and borehole geophysical measurements, collection of additional well data and water-level measurements, and installation of three stream-gaging stations (two equipped with recording rain gages) and a stream-sediment sampler Includes diagram of surface water hydrology and ground water hydrographs of selected wells

Hydro-Search, Inc., 1985, Draft Report, Hydrogeologic Characterization of the Rocky Flats Plant, Golden, Colorado, prepared for Rockwell Int'l. Corp. under Project No. 1520, 163 p., 5 tables, 11 figs., 2 plates, appendices A-F. Source: RFP Library.

Report describes the ground-water hydrology and chemical conditions at Rocky Flats with recommendations for improvement. Provides data for 56 on-site wells, completion information for geologic logs and wells, and geochemical data for 1983 and 1984 Discusses two field programs-a geophysical logging of 9 existing wells to define sub-surface stratigraphy, and single hole draw-down-recovery tests in ten wells for developing on-site hydraulic conductivity values for the Rocky Flats alluvium, the Arapahoe Formation, and the valley fill materials Appendices include geophysical logs, geochemical data, volatile organic data, and procedures for ground-water sampling, field water quality testing, and water sample preservation

Hydro-Search, Inc., 1986, Electromagnetic Survey, Rocky Flats Plant, Golden, Colorado (Project No. 106G05502). Source: RFP Library.

Report discusses the electromagnetic survey that was conducted along the periphery of the security area and the downgradient drainages in the buffer zone It was performed along relatively constant geologic materials so that the only variable would be the conductivity of the groundwater The survey found several areas of relatively high ground conductance which appear to correlate with the areas of saturated surficial material based on the 1986 drilling program

Hydro-Search, Inc., 1986, Geological and Hydrogeological Data Summary, USDOE Rocky Flats Plant, Golden, Colorado. Source: RFP Library.

The existing geologic, hydrologic, and water quality data for the Rocky Flats Plant are summarized in this report. Included is a description of the geology, both regional and local geologic setting, groundwater hydrology, groundwater chemistry and surface-water hydrology This information is based on previously collected data and reports Includes a complete reference of all known hydrologic and soils reports Figures, tables and plates, cover cross-sections, water table conditions, possible contaminant source areas, surface water monitoring locations, details of existing monitoring wells at the Rocky Flats Plant, details of drawdown-recovery tests at the plant, groundwater sampling program, and monitor well location at the plant

Hydro-Search, Inc., 1988, Front Range Lightweight Aggregate Project, Official Development Plan, Written Restrictions, Supporting Documentation, Prepared for L.C. Holdings, Inc., Project No. 241P08252, 38 p., 3 tables, 10 maps. Source: RFP Library.

Zoning plan prepared in response to a proposal by L C Holdings, Inc in which an open pit mine containing shale, sand, and gravel (located west of CO Hwy 93) and a processing plant (located east of CO Hwy 93 in the vicinity of Rocky Flats) would be reactivated and operated Discusses the surface and ground-water hydrology of two channels--Coal Creek and the South Boulder Diversion Canal, the impact of precipitation on the surficial materials, and the hydrology of the Fox Hills sandstone, the Hygiene Sandstone Member, and the sandstones of the Dakota group Describes the water infiltration from the Rocky Flats gravels into the Coal Creek drainage basins and sub basins (p 19-23), and provides drainage design criteria and hydrologic data [NOTE Information on drainage, geology, and soils, etc , is contained in the Official Development Plan supporting documentation]

Hydro-Search, Inc., 1988, Front Range Lightweight Aggregate Project, Plat, Supporting Documentation, Prepared for L.C. Holdings, Inc., Project No. 241P08252, 9 p. text, 55 p. water supply documentation and correspondence, 3 maps. Source: RFP Library.

Provides water-discharge records for the Platte River Basin measured in cubic feet/second (sec 13, T 2 S , R 71 W) for the period October 1981 to September 1982 Includes a residential and commercial stream alpha list or well print out for District 6 requested by Wright Water Engineers

Hynes, J.L., and Sutton, C.J., 1980, Hazardous Wastes in Colorado: A Preliminary Evaluation of Generation and Geologic Criteria for Disposal, CO Geol. Survey Info Series 14, 100 p., 8 figs , 6 tables, 1 pl. Source: USGS Library (271) C3ic, CO Geol. Survey distribution $8.

Statewide evaluation of geologic formations which may be suitable for location of a hazardous waste disposal facility in Colorado Map shows distribution of geologic formations Region III which includes Jefferson County generates 38% of the state's hazardous waste due to the fact that the majority of the population and industry are located there

Imlay, R.W., 1952, Correlation of Jurassic Formations of North America, Exclusive of Canada, Geologic Society of America Bulletin, vol. 63, p. 953-992. Source: USGS Library G(200) G29.

Summarizes existing knowledge of the Jurassic of North America (excepting Canada) and indicates areas or problems where more detailed study is most needed Jurassic Formations are grouped under five large regions--one of those being the Western Interior of the United States An index map shows that Ralston Creek is one of the localities included in that region

Irvine, B.M., 1962, Geologic Investigation of Landslides in the Ralston Creek Area, Jefferson County, Colorado, [abs.], Geol. Soc. America Spe. Paper 68, p. 92. Source: USGS Library G(200) G29sp.

Discusses the Ralston Creek landslides with analysis of bore-hole data for two distinct landslide zones Correlates the influence of the Arapahoe Formation on the slide locations

Irvine, B.M., 1963, Ralston Creek Landslide, Jefferson County, Colorado, CO Univ. Studies Ser. Geology, No. 2, 20 p. Source: CU Archives.

Discusses the Ralston Creek landslide which began moving in April 1956 and continued as a slump earth flow at the time of the article The article describes the two zones of movement and the influence on the slide location The montmorillonite clay in the Arapahoe formation is an important influence on the slide location which results in slopes with low shear strength and high activity and sensitivity Indicates slide velocity is variable and is directly related to precipitation Discussed surface features, subsurface data, movement mechanics and movement influences Accompanying the text are a series of photographs, diagrams and graphs illustrating the landslide

Jacob, A.F., 1983, Mountain Front Thrust, Southeastern Front Range and Northeastern Wet Mountains, Colorado, Rocky Mountain Association of Geologists, p. 229-244.

Discusses deformation of the Denver Basin and the Front Range including faulting and folding Also included is a discussion of the important reservoir rocks beneath the thrusted Precambrian rocks, such as the Lyons Sandstone, the Lower Cretaceous J sandstone, and the Upper Cretaceous Codell Sandstone, Niobrara Formation, and Pierre Shale

Jensen, F.S., and Scott, G.R., 1951, The mineral resources of the Rocky Flats Site near Denver, Colorado, Engineering Geology Branch Geologic Division, U.S.G.S. Source: RFP Library,

Discusses the known mineral resources of the Rocky Flats area. Lists gravel, clay, and sub-bituminous coal as the resources Describes in more specific local where prospects might be as well as estimates amount of material possibly found for each and describes the geology Commercial value, for the time, is also given

Johnson, J.H., 1925, The Geology of the Golden Area, Colorado, CSM Quart., vol. 20, no. 3, 25 p. Source: USGS Library S(271) C78.

Original version of Johnson's field handbook. Final version published in 1934 See below

Johnson, J.H., 1930, The Geology of the Golden Area, Colorado, CSM Quart., vol. 29, no. 4, 1934, 36 p. Source: ESCI Library - CU

Presents the local geologic features of the Golden area. Intended as a handbook for Colorado School of Mines Discusses the location and area, the physiography, drainage and drainage development, general geology and stratigraphy Paleozoic deposits, mesozoic deposits, cenozoic deposits, igneous rocks, structure, and geologic history Included are photographs, graphs, geological maps, and structural sections

Johnson, J.H., 1930b, Unconformity in Colorado Group in Eastern Colorado, Am. Assoc. Petroleum Geol. Bull., vol. 14, no. 6, p. 789-794. Source: ESCI Library - CU

Presents facts which indicate an unconformity exists between the Benton Group and the Niobara formation Listed in the article are the criteria that are used to recognize sedimentary breaks within a series of fine marine sediments The findings of the conglomerate are detailed by number of matters found, texture, and size These elements indicate an unconformity caused by emergence and erosion Other evidence may include distinct faunal differences How much of a time interval is represented by this unconformity was not prepared at the time of the article

Johnson, J.H., 1934, Introduction to the Geology of the Golden Area, Colorado, CSM Quart., vol. 29, no. 4, 36 p. Source: USGS

Third edition of a field handbook on the general geology of the Golden area extending to Ralston Creek on the north Highlights physiography, drainage and drainage development, stratigraphy of rocks ranging in age from the Pre-Cambrian to the Recent with a mention of the Arapahoe-Denver and Quaternary Formations, Igneous rocks, structure of folds and faults, and geologic history

Kent, H.C., 1972, Review of Phanerozoic History, In Geologic Atlas of the Rocky Mountain Region, W.W. Mallory (ed.) p. 57-59. Source: ESCI Library- CU.

A description of the sequence of events in geologic history for the Rocky Mountain Region Six sequences are used to divide the times from oldest to youngest. Both standard geologic system terminology and the sequences as defined by Sloss (1963) are used for classification Each sequence from Cambrian-Early Ordovician (Sauk sequence) to Tertiary-Quaternary (Tejas[?] sequence) are detailed in their development.

Keroher, G. C. and others, 1966, Lexicon of Geologic Names of the United States for 1936-1960, U.S G.S. Bulletin 1200, 3 parts, p. 4341. Source C.S.M.

Lists officially recognized formations and their ages, gives the chronologic sequence of investigation leading to the current formation lithologic description, stratigraphic position, areal extent, and type area

Kessler, L. G., 1971, Characteristics of the Braided Stream Depositional Environment with Examples from the South Canadian River, Texas, WGA Earth Science Bulletin, p.25-35. Source: CSM.

Article indicates characteristics and methods for recognizing braided channels Reports that braided channels were the dominant continental fluvial type during the Paleozoic and Mesozoic time period hence an understanding of braided channels is important for interpretation of ancient continental rocks Information includes definition and types of braided streams and their importance The Canadian River

in Hutchinson Roberts and Hemphill Counties, Texas was studied to consider the importance of the braided channels in the geologic record Discusses previous work on the Canadian River and on braided streams, the methods used for investigation, and the findings of those investigations Includes references, maps, and graphs

Kirkham, R.M., 1977, Quaternary Movements on the Golden Fault, Colorado, Geology, vol. 5, no 11, p. 689-692. Source: USGS Library.

Reports that the Golden Fault is a part of the structural zone that bounds the east flank of the Front Range Discusses recent trench excavations through a part of the fault zone near Golden that reveal a minimum of two periods of movement and reviews trench stratigraphy and structure

Kirkham, R.M., and Ladwig, L.R., 1980, Energy Resources of the Denver and Cheyenne Basins, Colorado-Resource Characteristics, Development Potential, and Environmental Problems, CO Geol. Survey Envirnt'l. Geol. 12, 258 p., 86 figs., 16 tables, 2 apps., 2 pls. Source: USGS Library (271) C3eg, CO Geol. Survey distribution $15.

Describes deposits of coal, lignite, uranium, oil, and gas that occur in the Denver and Cheyenne Basins Study contains regional geology and geography, bedrock stratigraphy, hydrogeology, coal resources, and uranium resources Includes maps of cross sections, geophysical logs of petroleum drill holes, drainage basins, and alluvial aquifers

Kirkham, R.M., and Rogers, W.P., 1981, Earthquake Potential in Colorado-A Preliminary Evaluation, CO Geol. Survey Bull. 43, 175 p., 3 pl. Source: USGS Library, CO Geol. Survey distribution $15.

Describes six regional seismotectonic settings, potentially active faults, Colorado seismicity, relationships between earthquake history and geology, and seismic hazards and implications for land use Includes coverage of the Golden Fault and Graben near Golden, including trench stratigaphy, structure, and summary of Quaternary geologic history of the trench site

Lackey, J.G., Jones, E.B., and Wollenberg, H.A., E.G. and G., Inc., 1976, Summary of Non-Nuclear Remote Sensing at the Rocky Flats Site and Status of Analysis of Geological and Hydrological Indicators--July 1975 Through December 1975, EGG-1183-1679, In U.S. Department of Energy, Final Environmental Impact Statement, 1980, vol. 2, appendix C-1, p. C-1-1 to C-1-19. Source: RFP Library.

Project to acquire a catalog of remotely sensed data in the form of photographic and thermal infrared imagery to supplement available data about and help in the interpretation of geological, hydrological, and ecological environment at Rocky Flats

Lackey, J.G., Jones, E. B., and Wollenberg, H. A., 1976, Summary of EG&G Non-nuclear Remote Sensing at Rocky Flats Site and Status of Analysis of Geological and Hydrological Indicators- July 1975 through December 1975, 20 p. Source: RFP Library.

Report includes a description of the data acquisition and activities that produced all available imagery and data, the findings of the program to date relative to hydrological and geological indications, the field investigation performed to verify the interpretations and results of the investigation, and interim recommendations for additional investigations necessary to resolve uncertainties identified to date

Langman, J. W., Jr., 1985, Parautochthonous Core-Thrusted Kink Folds and Chronologic Sequence of Thrusting, LaBarge Platform, Sublette County, Wyoming (abs.): AAPG Bulletin, v. 69, p 853-854.

Article describing the formation of folds in the footwall of the La Barge, Prospect, and Darby thrusts Investigation of the process of these folds has uncovered the sequence of thrusting for the area The sequence from youngest to oldest is as follows Calpet, La Barge, Tip Top, Dry Piney, Lake Ridge (Proposed), Prospect, Darby (Hogsback), One Mile (Proposed), and Cretaceous Mountain

Larson, E., and Hobblitt, R., 1973, Nature of the Early Tertiary Intrusives Between Golden and Lyons, Colorado, and Their Relationship to the Structural Development of the Front Range, Geol. Soc. America, Rocky Mtn. Section Guidebook, Meeting 26, no. 4, 5 p. Source:

Describes the occurrence, dimensions, petrography, chemistry, structure, and paleomagnetism of intrusives

Larson, F.E., Mutschler, E., and Brinkworth, G.L., 1969, Paleocene Virtual Geomagnetic Poles Determined from Volcanic Rocks Near Golden, Colorado, Earth Planet. Sci. Lett., vol. 7, no 1, p. 29-32. Source: USGS Library 209 Ea76.

Report on two virtual geomagnetic poles determined from basaltic volcanic rock samples from North Table Mountain near Golden.

Laughon, R.B., 1963, A Study of Weathering of Terrace Gravels Along South Boulder Creek (Boulder County), Colorado, Univ. of CO Thesis T-1963. Source: Univ. of CO Library L36 C 1.

Study of the weathering of some of the alluviums in the Colorado Piedmont along South Boulder Creek The topography section briefly mentions the Rocky Flats pediment Includes discussion of soils, including those of Rocky Flats, and original lithologies and weathering effects on the soils

Laurent, J.S., 1958, Structural Geology of the Foothills From Left Hand Canyon to Boulder (Boulder County), Colorado, Univ. of CO Thesis T-1958. Source: Univ. of CO Library L373 g C.1.

Study of the foothills belt north of Boulder to Left Hand Canyon Reviews structural geology of the area with minor information on geomorphology, igneous petrology, paleontology and age, and depositional environment of sediments Includes a detailed geologic map with supplementary cross sections, block diagrams, and stratigraphic sections

Lavington, C.S., and Thompson, W.O., 1948, Structural Geology, In Field Trip 1: Geology of the Eastern Flank of the Front Range of Colorado, CSM Quarterly, vol. 43, no. 2, p. 28 and 31. Source USGS Library S(271) C78.

Briefly describes the structural geology of the Front Range and the faults that run parallel to the mountains near Boulder Explains that the faults were the result of forces that originated south of

Boulder which caused en echelon folds to develop in the north and a series of faults, mostly of the thrust type such as the Golden Fault, to develop west of Boulder

Lavington, C.S., and Thompson, W.O., 1948, Post-Mississippian Stratigraphy, In Field Trip 1: Geology of the Eastern Flank of the Front Range of Colorado, CSM Quarterly, vol. 43, no. 2, p. 36-52. Source: USGS Library S(271) C78.

Attributes folding along the east margin of the Front Range to the Laramide revolution Discusses stratigraphic units in rising order of deposition from the Pre-Fountain surface to the Laramie and younger Formations mentioning the Dawson, Arapahoe, and Denver Formations

Lee, W.T., 1900, The Origin of the Debris-Covered Mesas of Boulder, Colorado, Jour. Geology, vol. 8, p. 504-511. Source: USGS Library G(200) J83.

Study of the series of table lands, or mesas, which rise 300-500 feet above Boulder Creek at the base of the mountains south of Boulder. Discusses the Fort Pierre shale and the Benton, Niobara, and Dakota Formations, and the debris found on the cap of the mesas which is composed of sandstone and conglomerate from the Red Beds of the Permo-Trias age. Includes a diagrammatic section of a mesa

Lee, W.T., 1927, Correlation of Geologic Formations Between East-Central Colorado, Central Wyoming, and Southern Montana, USGS Prof. Paper 149, 80 p. Source: USGS Library, not avail. for purchase.

Study traces the stratigraphy and structure of sedimentary rocks from Colorado Springs, Colorado to southern Montana for the purpose of correlating the various formations with the potential for oil and gas recovery in Wyoming Applicable Colorado formations discussed in brief include the Niobara, Benton, and Morrison, and the Dakota group in an area from Morrison in Jefferson County to Eldorado Springs in Boulder County.

Levings, W.S., 1932, A Magnetic Survey of the Ralston Dike, Jefferson County, Colorado, CSM Quarterly, vol. 27, no. 3, p. 39-41. Source: USGS Library S(271) C78.

Provides a qualitative interpretation of a magnetic survey of the Ralston Dike based on observations at nearly 300 stations situated along several traverses that cross the dike The basalt dike is located in T 3 and 4 S, R. 70 W with Ralston Creek flowing at its northern end Niobara limestones and shales dip eastward near the stream bed of Ralston Creek about 1/2 mile west of Ralston Dike.

Lickus, R.J., and LeRoy, L.W., 1968, Precambrian Structure and Stratigraphy Along the Mountain Front West of Golden, Jefferson County, Colorado--Reconnaissance Study, In Geophysical and Geological Studies of Relationships Between the Denver Earthquake and the Rocky Mountain Arsenal Well, Part A, CSM Quarterly, vol. 63, no. 1, p. 129-165. Source: USGS Library S(271) C78.

Result of reconnaissance mapping of Precambrian rock exposures about 22 miles west of the Rocky Mountain Arsenal Well as part of earthquake studies of the well Study area was about 2 miles wide and 18 miles long, extending from Ralston Creek on the north to Turkey Creek on the south The area between Ralston Creek and Clear Creek was one of 12 separate units addressed

Lindstrom, L.J., 1978, Stratigraphy of the South Platte Formation (Lower Cretaceous), Eldorado Springs to Golden, Colorado, and channel Sandstone Distribution of the J Member, CSM Thesis T-2053, 305 p., 6 pl. Source: CSM Library Front Desk.

Study describes and correlates the members of the South Platte Formation (T 1 N to T 3 S, R 71 W to R 65 W) exposed in outcrop along the Dakota Hogback to establish environments of deposition of the individual process-controlled genetic units, as well as the units comprising the J Sandstone Member Describes measured sections in T 2 S to T 3 S, R 70 W to R 71 W

Lord, R.V. & Assoc., Inc., 1962, Subsurface Investigation Planned Site for Building 79, U.S. Atomic Energy Commission Rocky Flats Facility, Boulder, Colorado, Prepared for Norman Engineering Company, 7 p. Source: RFP Library.

Summary of the investigations of the soil conditions and characteristics pertinent to the design and construction of foundations for building 79 at Rocky Flats Logs of each of the 6 test borings are in the report The laboratory investigations included determination of certain index properties, shearing strength of the soils, and their consolidation and swelling characteristics

Lord, R.V. and Assoc., Inc., 1967b, Subsurface Investigation at the Site of Proposed Addition to Building 79, Dow Chemical Company, Rocky Flats, Colorado, Prepared for Lovell, Osnes, Nisbet Consulting Engineers, 4 p. Source: RFP Library.

Results of a subsurface soil investigation for the proposed addition to building 79 Field investigation consisted of 6 borings and three test pits Samples were taken and logs made to indicate the classification of soils, standard penetration test results, resistance to excavation and other information Recommendations for structures at this site were that they be designed for continuous wall or spread-type footings bearing in the gravel soil Supplemental data collected for additional test boring accompanies report. Boring logs are part of report.

Lord, R.V. and Assoc., Inc., 1966, Subsurface Investigation Decontamination Building, Rocky Flats Plant, Boulder, Colorado, Prepared for R.J. Rice and Associates, 4 p. Source: RFP Library.

Report on subsurface investigation made for the proposed decontamination facility at the Rocky Flats Plant. Borings were made to determine soil conditions and characteristics Logs of borings showed field classification of the soils standard penetration test results, ground water data, etc Laboratory testing was used to verify soils classification Included in this report is the soil profile, test hole location plan, utility and site plan, and the boring logs

Lord, R.V. and Assoc., Inc., 1967a, Subsurface Soil Investigation of Proposed Building No. 50 and Building No. 07, Rocky Flats Plant Site, Prepared for C.F. Braun Company, 16 p. Source: RFP Library.

Results of subsurface investigation for buildings 50 and 07 at the Rocky Flats Plant Investigation was preformed to obtain technical information and soil properties needed to design and construct these facilities Field investigation consisted of 9 test borings Described in the report thoroughly are subsurface soil conditions and recommendations according to those findings Includes complete logs of boring operations, graphs, diagrams, and charts with summary of test results

Lord, R.V. and Assoc., Inc., 1968a, Subsurface Soil Investigation at Sites of Building 40, 65, and 83 at the Rocky Flats Plant, Prepared for C.F. Braun Company, 11 p. Source: Rocky Flats Soil Investigation Files.

Results of subsurface investigation for buildings 40, 65, and 83 at the Rocky Flats Plant Technical information and soil property data are the scope of this investigation Twelve test borings were made to sample the soils Laboratory tests performed to measure critical shear and consolidation of the soils Includes characterization of soils, outline of proposed structures and recommendations for each building Logs of boring operations, visual classifications of each soil, locations of changes, standard penetration test results and water measurements are included

Lord, R.V. and Assoc., Inc., 1968b, Subsurface Soil Investigation of Proposed Building No. 08 and Building No. 95, Rocky Flats Plant Site, Prepared for C.F. Braun and Company, 9 p. Source: Rocky Flats Soil Investigation Files.

Results of subsurface investigation for the sites of proposed building 08 and improvements to building 95 at the Rocky Flats Plant. Obtained was the technical information and soil property data necessary for the design and construction of these facilities. The investigation consisted of 5 test borings which were deep into bedrock to assure continuity Laboratory tests were preformed to measure critical shear and consolidation. Tests included unconfined compression, consolidation, Atterburg limits, moisture content and In-place density A description for the proposed structures and recommendations for each are described. Includes complete logs of boring operations, visual classification of soil, location changes, standard penetration test results and water measurements

Lord, R.V. and Assoc., Inc., 1970, Subsurface Soil Investigation at Addition Site to Building 779, Dow Chemical Company Rocky Flats Plant, Colorado, Prepared for Lovell-Osnes-Nisbet Company, 3 p. Source: Rocky Flats Soil Investigation Files.

Results of subsurface soil investigation for the addition to building 779 at the Rocky Flats Plant Obtained was soil property data and technical information needed for the design and construction of the building Six test borings were made and standard penetration test were made to obtain an index of soil uniformity and to provide relative bearing data. Describes the subsurface soil conditions and states recommendations made due to findings Test hole boring logs are included

Lord, R.V. and Assoc., Inc., 1972a, Subsurface Investigation, Proposed Fuel Oil Storage Tank, Vicinity of Central Avenue and Seventh Street, Rocky Flats Facility, South of Boulder, Colorado, Prepared for Dow Chemical Co., 4 p. Source: Rocky Flats Soil Investigation Files.

Report on the results of the subsurface soil investigation for the proposed fuel oil storage tank to be located in the Rocky Flats Plant. Field investigation consisted of four test borings all carried to contact with the underlying claystone bedrock. Laboratory tests were used to verify field classification and evaluation of swelling potential of the clay soils Described are the contents of the subsurface soils It is recommended due to investigation that the structure be founded on a standard mat or raft type foundation Included in report is test hole boring logs, location of identifiable soil changes, standard penetration test results, sample locations, and water measurements

Lord, R.V. and Assoc., Inc., 1976, Subsurface Soil and Groundwater Investigation for Existing Building 928, Rocky Flats Plant Site, Prepared for Rockwell International, 8 p. Source: RFP Library.

Results of subsurface soil and groundwater investigation for building 928 Investigation directed to clarify an earlier study that showed water table at a lower level, and to ascertain if the groundwater seepage was natural or if its origin was leakage from the tank Field investigation consisted of five test borings in which were made standard penetration tests to obtain an index of soil uniformity and relative bearing data. Described are the subsurface soils, laboratory testing, and recommendations based on the findings Included in report is a complete log of the borings, locations of identifiable soil changes, standard penetration test results, sample locations, and water measurements Assoc , Inc , 1977, Dam Sites Investig

Prepared for Rockwell International, Rocky Flats Plant, 19 p Source Included in publication of Woodward-Clyde Consultants, 1977, Job no 21304-350

Report on subsurface soil investigations on the feasibility of earth-fill dam construction at A4, across North Walnut Creek, in SW 1/4, SW 1/4, sec 1, T 2 S , R 70 W , B5, across South Walnut Creek, in NW 1/4, NW 1/4, sec 12, T 2 S , R 70 W , and C2, across Woman Creek, in SE 1/4, SE 1/4, sec 11, T 2 S , R 70 W. Includes test hole data, table on soil types, and gradation data

Lord, R.V. and Assoc., Inc., 1962, Subsurface Investigation Facilities Expansion, U.S. Atomic Energy Commission Rocky Flats Plant, Boulder, Colorado, Prepared for Associated Nucleonics, Inc., 7 p Source: RFP Library.

Results of investigation to determine subsurface soil conditions and characteristics necessary for the planned facilities expansion adjacent to buildings 71 and 74 at the Rocky Flats Plant. Six test borings were drilled for sampling Logs were made of each and include field classification of the soils, penetration test results, ground water level, etc. Report describes the laboratory investigation, the subsurface conditions, and recommendations based on the findings Includes location of borings, boring logs, data and results of penetration test, and diagrams of standard consolidation swell test

Lovering, T.S., 1929, Geologic History of the Front Range, Colorado, Colorado Science Society Proceedings, vol. 12, no. 4, p. 59-111. Source: USGS Library S(271) C86.

Presents the geologic history of the Front Range from Paleozoic to Recent times to provide a consistent correlation of Precambrian rocks, summarize the paleogeography of the Paleozoic and Mesozoic ages, and offer new tentative solutions of the Laramie problem of the Tertiary peneplains Late in the Eocene, between Golden and Boulder, where the maximum uplift had taken place, the topography was probably that of a mountainous upland rather than a nearly level plain The greatest uplift, judging from the sharpness of the folding and intensity of faulting, occurred in the region limited on the northeast by a line extending from Golden to Boulder and the southwest by a line reaching from Como to a point about 10 miles north of Dillon

Lovering, T.S., and Goddard, E.N., 1938, Laramide Igneous Sequence and Differentiation in the Front Range, Colorado, Geologic Society of America Bulletin, vol. 40, no 1, 2 pl., 7 figs., p. 35-68 Source: USGS Library G(200) G29.

Study of the Laramide (late Cretaceous-early Eocene) igneous rocks or "prophyries" in the Front Range Discusses the general character, age relations, and magnetic differentiation of the prophyries of the Laramide Igneous Rocks in the western and eastern part of the Front Range In the east, the earliest Laramide igneous rocks are represented by andesite pebbles in the Upper Cretaceous part of the Denver Formation of the Denver Basin. Pebbles first appear about 600 feet above the Laramie Formation, while in the next 400 feet most material is andesitic detritus

Lovering, T.S., Aurand, H.A., Lavington, C.S., and Wilson, J.H., 1932, Fox Hills Formation, Northeastern Colorado, Am. Assoc. Petroleum Geol. Bull., vol. 16, p. 702-703. Source: USGS Library G(200) Am3.

Clarifies the definition of the Fox Hills Formation

Lowell, J.D., 1970, Antithetic Faults in Upthrusting, Am. Assoc. Petroleum Geol. Bull., vol. 54, no. 10, p. 1946-1950. Source: USGS Library G(200) Am3.

Describes the relative importance of antithetic faults in upthrusting and the consequential effect on subsurface interpretations Includes information on the Golden Fault

Machette, M.N., 1975b, The Quaternary Geology of the Lafayette Quadrangle, Colorado, Univ of CO, M.S. thesis T-1974, 106 p. Source: Univ. of CO Library M123 C.1.

Thesis on an area 8 miles east of the mountain front in the central Colorado Piedmont to report on pre-Quaternary and Quaternary deposits, soils, correlation and age of Quaternary deposits, and Quaternary geologic history

Machette, M.N., Birkeland, P.W., Markos, G., and Guccione, M.Q., 1976, Soil Development in Quaternary Deposits in Golden-Boulder Portion of CO Piedmont, In Studies in Colorado Field Geology, CSM Prof. Contrib. no. 8, p. 339-357. Source: USGS Library S(271) C78pc.

Result of a field trip between Golden and Boulder to examine the changes in several key properties of soils, primarily as a function of time Stopped at terraces made up of gravely alluvium derived from the mountains to the west, identified buried soils, and compared these to mountain soil Observed the bedrock geology, the core of the Front Range composed of Precambrian granite, gneiss, and schist, and the outcrop west of the mountain front near Clear Creek formed by quartzite, the steeply dipped beds of Paleozoic and Mesozoic sandstone, shale, and limestone located near the east flank of the range, and the more resistant sandstone units which form the hogbacks and flatirons The bedrock in the plains is formed by Cretaceous shale and sandstone and some Tertiary sandstone and basalts Quaternary alluvial gravel overlie the surfaces cut on the resistent and nonresistant rock types See USGS Open-File Report 76-804 below

Machette, M.N., Birkeland, P.W., etal., 1976, Field Descriptions and Laboratory Data for a Quaternary Soil Sequence in the Golden-Boulder Portion of the Colorado Piedmont, USGS Open-File Report 76-804. Source: USGS Library (200) R290.

Provides field descriptions of soil and laboratory data for seven gravel pits, roadcuts, and arroyos measured at ground level to 10 to 15 feet below the surface

Major, M.W., 1981, The Rocky Mountain Arsenal Well and the Denver Earthquakes, In Colorado Tectonics, Seismicity, and Earthquake Hazards, N.R. Junge, ed., CO Geol. Survey Special Paper, no. 19, p. 23. Source: USGS Library G(200) G29sp.

Brief discussion of the controversy surrounding the cause of the Denver earthquakes associated with fluid injection at the Rocky Mountain Arsenal

Major, T.J., Robson, S.G., Romero, J.C., and Zawistowski, S., 1983, Hydrologic Data from Parts of the Denver Basin, Colorado, USGS Open-File Report 83-274, 425 p. Source: USGS Library (200) R290, not avail. for purchase.

Presents hydrologic data collected and compiled during 1956-1981 for all major aquifer systems above the Pierre shale-including the Alluvium, Castle Rock Conglomerate, Dawson, Arapahoe, and Laramie-Fox Hills Consists of records for 870 wells, including water-level data for 158 wells, and water-quality analysis for 561 wells

Malde, H.E., 1955, Surficial Geology of the Louisville Quadrangle, Colorado, USGS Bulletin 996-E, p. 217-259. Source: USGS Library (200)M, USGS distributes $2.25.

Study of three main divisible groups of surficial deposits--pre-Wisconsin, Wisconsin, and Recent--including extensive descriptions of gravel deposits from each group The dissected erosion surface known as, Rocky Flats, fans out from Coal Creek Canyon and ends near the south border of the quadrangle It transects the Pierre shale, Fox Hills sandstone, and Laramie Formation, and cuts across the steeply dipping older sediments including the Dakota and Fountain Formations Rocky Flats is capped by a strongly weathered gravel composed of about 60% quartzite, 20% schist and gneiss, 12% granite and pegmatite, and 8% sandstone and siltstone

Malde, H.E., and Van Horn, R., 1965, Stratigraphy, Soil, and Geomorphology of the Nonglacial Quaternary Deposits Between Boulder and Golden, Colorado, Trip 8: In Guidebook for 1-Day Field Conf., Boulder Area, Colorado, Int'l. Assoc. of Quaternary Research, 7th Congress, USA, 1965, Lincoln, NE, Acad. of Sci., p. 40-47. Source:

Field trip describing a sequence of alluvial deposits between Boulder and Golden

Mann, D.M., 1960, The Geology of an Area Near Eldorado Springs (Boulder County), Colorado, Univ. of CO Thesis T-1960. Source: Univ. of CO Library M315 g C.1.

Discusses post Cambrian sedimentary rocks, Precambrian rocks, faults, folds, lineation, and foliation in Precambrian rocks and joints for an area 18 miles northwest of Denver in the foothills of the Colorado Front Range

Marchand, D.E., et al., 1979, Soils as Dating Technique; Preliminary Results from Five Chronosequences in the Western United States [Abs.], Geol. Soc. America, Abstract with Programs, vol. 11, no 7, 00167592, p. 471. Source: ESCI Library - CU

Report discusses the efficiency of using soils as a dating technique Study areas include Cowlitz River in Washington, the Front Range in Colorado, the Western Sierra Nevada foothills and San Joaquin Valley in California. Indicates morphological properties which are visible in the fields or soil thin sections which are the most reliable age indicators Age estimates of relict soils are attainable to within about twenty-five percent.

Marshall, G.E., and Stephens, J.R., 1968, Observations of Earth-Tilt and Earthquake Correlation, Denver Area, Colorado, Earthquake Notes, vol. 39, March-June, p. 23-36. Source: USGS Library.

Report on correlation between earth surface tilt and earthquakes Observations made at the Inertial test facility of the Martin Marietta Corporation, Waterton, Co Studies show that during an 8 month period in 1967, 18 local earthquakes were recorded, 15 of which were preceded by measurable unidirectional tilt 7 to 48 hours prior to the earthquake. Article discusses the geologic setting of the facility, its laboratory facility, instrumentation used to monitor test pad, and tilt meter data Tables include data summary, with text to explain further, block diagram showing seismometer system, figure which illustrates Talyuel Tilt instrumentation electronic level and a polar plot of the resultant from the data summary

Martin, C.A., 1965, Denver Basin, Bulletin of the American Association of Petroleum Geologists Bulletin, vol. 49, no. 11, p. 1908-1925. Source: USGS Library G(200) Am3.

Provides a history of the Denver Basin and its structural setting

Materials and Substructures, Inc., 1964, Assembly Plant Addition to Building 77-A, Rocky Flats Plant, Dow Chemical Company, Lovell, Osnes, Nisbet Consulting Engineers, Project No. 1106, 2 p. Source: RFP Library.

Report on soils investigation for the assembly plant addition to building 77-A at the Rocky Flats Plant Four test holes were drilled and standard penetration tests were made in the test holes to evaluate bearing capacity of the soils Recommendations are made based on findings Included in report is a site plan, key to boring logs, and boring logs

Materials and Substructures, Inc., 1971a, Soils and Investigation for West Access Road Improvements, Rocky Flats Plant, Atomic Energy Commission, Jefferson County, Colorado Source RFP Library.

Reports on soil investigation for the improvement of the west access road between the west guard house and Colorado 93 Drilling and testing of 32 holes took place Samples were collected for classification purposes and laboratory tests Recommendations made on outcome of tests Report includes test hole location plan, key to boring logs, boring logs and results of laboratory tests

Materials and Substructures, Inc., 1971b, Soils Investigation for Increased Water Retention, Rocky Flats Plant, Atomic Energy Commission, Jefferson County, Colorado. Source: RFP Library.

Report on soils investigation for increasing water retention in North and South Walnut Creeks and Woman Creek. Soil investigation made for the purpose of constructing one new dam, enlargement of three existing dams and construction of diversions Testing included drilling of test holes on the axis of all five existing dams and for the new diversion structures and channels The laboratory tests included unconfined compressive strength, residual shear tests, classification tests, mechanical analysis, and Atterberg limits Report includes the proposed construction, its previous and revised criteria, details of soil findings, description of existing dams, borrow, and infiltration rates Recommendations for raising the old dams and construction of the new dam are detailed Sections, summary of test data, soil profiles, logs of borings, maps, and charts are included in report

Materials and Substructures, Inc., Soils Investigation for Manufacturing Standards Laboratory, Dow Chemical Company, Rocky Flats Plant, Jefferson County, Colorado, Project No. 974, 2 p Source· RFP Library.

Report of soils investigation made for the manufacturing standards laboratory at Rocky Flats Plant Includes procedure, findings, and recommendations Test pits were used to log and take samples Reports footings at this site should be either continuous or isolated pad footings Report includes test hole locations, swell test results and boring logs

McCoy, A.W. III, 1953, Tectonic History of Denver Basin, Am. Assoc. Petroleum Geol. Bull., vol. 37, p. 1873-1893. Source: USGS Library G(200) Am3.

Report on the Denver Basin tectonic history

Moody, J.D., 1947, A Study of the Laramie Formation in the Golden Area, Colorado, Compass, vol 24, no. 3, p. 147-156. Source: USGS Library S(200) C732.

Study to investigate the stratigraphic relations of the Laramie Formation in the Golden-Morrison area (Denver and Salt Lake City Railroad to Weaver Creek) to the overlying and underlying beds and to investigate the nature of the sedimentation within the Laramie. The Laramie Formation comprises the strata between the basal Arapahoe conglomerate and the marine beds of the Upper Cretaceous Montana group The Arapahoe conglomerate is well-developed in the vicinity of Golden, in places well over 100 feet thick To the north of Golden it rapidly disappears, and no trace of it is found at Ralston Creek or Leyden Gulch

Moody, J.D., 1947, Upper Montana Group, Golden Area, Jefferson County, Colorado, Am. Assoc. Petroleum Geol. Bull., vol. 31, no. 8, p. 1454-1471. Source: USGS Library G(200) Am3

Examination of the upper part of the Montana gravel in the vicinity of Golden and Morrison, revealed the presence of a series of beds containing a well developed and varied Fox Hills fauna Beds are divided into four lithologic and fauna zones

Murray, D.F., 1967, Gravel Mounds at Rocky Flats, Colorado, Mtn. Geol., vol. 4. Source· USGS Library G(200)M 864.

Study of mounds of sorted gravel upon a pavement of cobbles and small boulders on the coarse alluvium of the Rocky Flats pediment. Pocket gophers are the source of the mounds

Nelson, Haley, Patterson, and Quirk, Inc., 1973, Subsoil Investigation for Proposed Water Storage Facilities for the Atomic Energy Commission at Rocky Flats, Project No. 73-1-CIV-0218, 5 p Source: RFP Library.

Results of subsoil investigation for the proposed water storage facilities at the Rocky Flats Plant Three test borings were drilled to obtain data on existing soil conditions Report includes the data gathered through field and laboratory work. Accompanied with the text is soils investigation summary sheet, test boring logs, consolidation test and map of the area.

Netoff, D.I., 1971, Polygonal Jointing in Sandstone Near Boulder, Colorado, Mtn. Geol., vol. 8, no 1, p. 17-24. Source: USGS Library G(200)M 864.

Study of the geology of Boulder including types of polygonal jointing, description of joint planes, origin of joints, and mechanisms of contraction

Oliveria, R.B.B. de, 1975, Exploration for Buried Channels by Shallow Seismic Refraction and Resistivity and Determination of Elastic Properties at Rocky Flats, Jefferson County, Colorado, CSM Thesis T-1718 (unpub.), 131 p. Source: CSM Library Front Desk.

Seismic investigation undertaken at Rocky Flats, a gravel-capped pediment, to reveal an irregular bedrock surface with several ancient channels Explains that the channels (unnamed) were probably eroded by streams flowing from Coal Creek Canyon and over time Rocky Flats alluvium was deposited on a pediment surface that had replaced earlier sedimentary deposits The broader channels at the bedrock surface were filled with gravel Successive erosional cycles cut lower pediments creating nine alluvial formations in the Colorado Piedmont Numerous intermittent streams dissect the surface of Rocky Flats and springs and seeps are common along the contact between the permeable sands and gravels of the Rocky Flats alluvium and underlying impermeable shales The Arapahoe Formation of the Upper Cretaceous is a conspicuous conglomerate averaging 100 feet in thickness containing fragments derived from local sedimentary rocks of older age and from the crystalline complex farther west.

Osterwald, F.W., Bennetti, J.B. Jr., and Dunrud, C.R., 1973, Preliminary Investigation of Seismic Tremors in the General Area of the Leyden Coal Mine Gas-Storage Reservoir, Colorado, USGS Open-File Report, 23 p. Source: USGS Library (200) R290. No. 1760.

Report presents the preliminary results of the seismic investigations of the Leyden Coal Mine Study to determine the response of coal mine pillars and overburden to changes in stress Monitored during one period of severe cold weather and summer so as to see response of mine to one cycle of gas withdrawal as well as when reservoir was idle (Monitoring was unable to take place in summer) Described in the report are the field investigations, seismic interpretation, and recommendations according to findings Indicates that at time of report additional research was necessary before conclusions could be drawn Illustrations and maps accompany text.

Parkinson, L.J. Jr., 1955, Geology of an Area East of Boulder (Boulder County), Colorado, Univ. of CO Thesis T-1956. Source: Univ. of CO Library P229g C.1.

Study of a 30 mile area bounded on the south by Marshall and Louisville and on the north by the White Rocks Cliffs The area occupies the northern third of the Louisville Quadrangle and the southwest quarter of the Niwot Quadrangle in parts of T 1 S and T 1 N, R 69 W and R 70 W Its center is 6 5 miles east of Boulder Report focuses on the stratigraphy of the Pierre, Fox Hills, and Laramie Formations, regional structure, local structure of faults and folds, and brief descriptions of well logs

Paschis, J.A., 1978, Schwartzwalder Uranium Mine, Ralston Creek Canyon, Jefferson County, Colorado, In Guidebook on Fossil Fuels and Metals, Eastern Utah and Western-Southwestern-Central Colorado, Shawe, D.R., ed., CSM Prof. Contributions No. 9, p. 87-89. Source: USGS Library S(271) C78pc.

Field trip to the Schwartzwalder Uranium Mine in Ralston Creek Canyon The mine is comprised of a biotite schist core overlain by siliceous calcite-hornblende gneisses The igneous rocks, tourmaline granite pegmatite intrudes and pitchblende, fill open spaces in the fault structures Includes first-level map, cross section, and stereographic diagram of the Precambrian rock setting of the mine

Patton, H.B., 1904, Fault Planes in the Dakota Fire Clay Beds at Golden [Abs.], Geologic Society of America Bulletin, vol. 15, p. 583. Source: USGS Library G(200) G29.

States briefly that three distinct kinds of faults exist in the fire-clay mines of the Dakota Formation in the vicinity of Golden. Focuses on a reverse fault found during actual mining operations

Paul, S.K., 1956, Gravity Survey of the South Boulder Area, Boulder County, Colorado, CSM Thesis T-820, 53 p, 5 maps, 2 pl. Source: CSM Library Front Desk.

Results of a gravity survey that encompassed the southern limits of Boulder, the Denver Basin, and the eastern slopes of the Front Range (T 1 S to T 4 S, R 67 W to 71 W) Includes field work and computations for Bouguer and isostatic anomalies and topographic correction Discusses faulting in the Fox, Belmont, and Gorham faults, but does make correlation between the lighter intrusives and the faults in the Fox Hills and Laramie Formations

Pearl, R.H., 1974, Geology of Ground Water Resources in Colorado, CO Geol. Survey SP 4, 47 p, 18 figs., 7 tables. Source: CGS Library, CO Geol. Survey distributes $3.

Report describes the ground-water resources of Colorado in relation to water quantity, quality, and distribution for various geographic regions Discusses the geological and hydrological conditions of the following geographic regions: South Platte River Basin, Eastern Colorado, Northern High Plains, North Platte River Basin, Arkansas River Basin, Southern High Plains (Cimarron River Basin), Rio Grande River Basin, and Western Colorado

Perry, S.L., 1985, Lineaments of the Northern Denver Basin and Their Paleo-Tectonic and Hydrocarbon Significance, CSM, Geology Dept. Source: CSM Library.

Thesis discusses the orientation and distribution of lineaments derived from landsat imagery, compares lineaments with geologic structures and previously mapped paleotectonic trends to determine correlation with basement structure and compares lineaments with known hydrocarbon occurrences to determine what relationships, if any, may be helpful in exploration Study area is the northern Denver Basin, covering 132,000 square miles, including parts of the adjacent Laramie and Front Ranges Twenty-four lineaments were interpreted for the Basin using the above mentioned statistical analysis of mapped linear features from Landsat imagery Discussed are the method of study, including image processing, image interpretation, linear feature analysis, field work, subsurface observations and the results

Pinckney, D.M., 1953, Structure in the Precambrian Coal Creek Series, Coal Creek Canyon (Jefferson County), Colorado, Univ. of CO Thesis T-1953. Source: Univ. of CO Library P651 s C.1

Study of the geology of a small area of Precambrian rocks exposed in Coal Creek Canyon near the east border of the Front Range. Describes lithologic units for an area one mile west of the Canyon in secs 11, 12, 13, and 14 of T 2 N, R 71 W Covers the Idaho Springs Formation, granite gneiss, quartzite, and phyllonite Information is given on the thickness of the beds, structure, and geologic history, and special attention is given to the folded quartzite one mile west of the Canyon mouth

Poleschook, D., 1978, Stratigraphy and Channel Discrimination of the J Sandstone, Lower Cretaceous Dakota Group, South and West of Denver, Colorado, CSM. Source: CSM Library.

Analysis of the local and regional stratigraphic characteristics of the J sandstone, in both outcrop and subsurface study areas of the Southern Denver Basin. Includes general geology of area, stratigraphy of the J sandstone, transitional zone of upper J sandstone, depositional patterns and tectonic implications

Porter, K.W., 1976, Stratigraphic Model for the Upper Cretaceous (Campanian) Hygiene Member, Pierre Shale, West Denver Basin, Colorado, CSM Thesis T-1818, 143 p., 8 pl. Source: CSM Library Front Desk.

Study defines the depositional parameters controlling and affecting sedimentation of the Hygiene Member, lowest sandstone in the Hygiene Interval (middle Pierre Shale), in T 1 S to T 5 N, R 71 W to R. 66 W. Study involves field, subsurface, petrographic, and paleontologic approaches to the delineation of environment.

Quiett, F.T., 1951, The Geology of the Plainview Area, Jefferson County, Colorado, CSM Thesis T-720, 80 p., 2 pl. Source: CSM Library Front Desk.

Study of the physiography, stratigraphy, and structure of a 4 2 square mile area located between Coal Creek Peak on the south and Bull Gulch on the north, including a portion of the Rocky Flats pediment formed from the eroded Dakota Formation. The composition of the quartzite boulders found at the Rocky Flats pediment is the same as the rocks found on Coal Creek Peak. The pediment has its final development on the Dakota and as it spreads out to the east it probably covers most of the Laramie group The Dakota sandstone, along with the other sediments, is considerably disturbed in the vicinity of Rocky Flats, causing faulting The surface of the pediment is dissected by eastward flowing streams from the Front Range, most notably the South Boulder Creek and Coal Creek

Rahmanian, V.D., 1975, Deltaic Sedimentation and Structure of the Fox Hills and Laramie Formations, Upper Cretaceous, Southeast of Boulder, Colorado, CSM Thesis T-1671, 83 p., maps. Source: CSM Library Front Desk.

Investigation of the stratigraphy, sedimentology, and depositional environments of the Fox Hills and its associated formations and a study of the effects, if any, on growth faulting in Late Cretaceous sedimentation in T 1 S, R 70 W and sections 1, 12, 13, and 24 of T 1 S, R 71 W

Riecker, R.E., 1956, Geologic History of the Boulder Region, Earth Science, vol. 9, no. 5, p. 20-26 and vol. 19, no. 6, p. 22-26. Source: USGS Library G(200) Ea6.

Report on the Coal Creek vicinity about 5 miles south of Boulder in the east foothills reveal considerable areas of quartzite, quartz-mica schists, and mica schists which are probably early Proterozoic in age The Arapahoe Formation of the Eocene age is interpreted as a series of alluvial fanglomerates composed chiefly of fine-to-coarse grained clastics, thinning rapidly to the south and southeast away from the highland source The basal conglomerate of the Arapahoe contains pebbles of all the older formations, including the Precambrian, and shows small erosional unconformity with the Laramie No evidence suggests a greater time interval between the development of the Laramie and Arapahoe than that between the Fox Hills and Laramie Formations The Precambrian pebbles in the Arapahoe reveal that deposition occurred during the Laramide Revolution.

Robb, G.L., 1948, Quaternary Pediments in the Golden Area, Colorado [Abs.], Colorado Wyoming Academy of Science, vol. 3, no. 5, p. 37. Source: USGS Library, S(271) C88.

Reports that many of the gravel capped mesas along the eastern slope of the Front Range are in reality pediment surfaces. Three major surfaces are represented in the Golden area--the highest surface being the Coal Creek pediment that extends east from the mouth of Coal Creek, the middle or Ralston pediment between Ralston Creek and Leyden Gulch, and on the eastern edge of the Coal Creek pediment the Ralston pediment is present in many places only as a transition zone between the upper and lower surfaces It is believed that many of the gravel capped surfaces along the Front Range can be correlated with these three pediment surfaces The upper pediment may be the high plains representation of Orodell Berm

Robinson, P., 1972, Tertiary History, In Geologic Atlas of the Rocky Mountain Region, W.W. Mallory (ed.), p. 233-242. Source: ESCI Library- CU.

Discusses the Rocky Mountain region during the Tertiary time Includes the Laramide Orogeny and the Paleocene epoch, the Eocene epoch, Oligocene epoch, Miocene epoch, and Pliocene epoch Each epoch discusses the formation in detail indicating its depositions and structural and stratigraphic relations Included is a correlation chart of Tertiary Formations which includes the basin/area, radiometric dates of known vertebrate faunas, and provincial age/stage terminology of N America, age/stage terminology of Europe, and epoch terminology as used by some European authors Maps consist of known and inferred areas of deposition and erosion for each of the time periods

Robson, S.G., 1984, Bedrock Aquifers in the Denver Basin, Colorado-A Quantitative Water-Resources Appraisal, USGS Open-File Report No. 84-431, 111 p. (superseded by USGS Prof. Paper P 1257, Robson). Source: USGS Library (200) R290, not avail. for purchase.

Contains a hydrologic evaluation of ground-water resources of the Denver Basin Includes mapping of aquifer extent, thickness, structure, hydraulic characteristics, and water-level and water-quality conditions Provides a simulation of aquifer response to various pumpage estimates and ground-water development plans Plates dated 1978 show measured and model-calculated potentiometric surfaces of bedrock aquifers

Robson, S.G., 1987, Bedrock Aquifers in the Denver Basin, Colorado; A Quantitative Water-Resources Appraisal, USGS Prof. Paper 1257, 73 p., 5 pl. (supersedes O-F Rpt. 84-431) Source: USGS Library, USGS distributes $4.25.

Information on study preformed in order to evaluate the effects of future pumpage on ground-water supplies The study area is 6,700 square miles and has 4 bedrock aquifers Study involved mapping of aquifer extent, thickness, structure, hydraulic characteristics, and water-level and water-quality conditions Report includes. other related studies, the natural hydrologic system, its stratigraphy, aquifer characteristics, water levels, recharge and discharge, and water quality. Simulated hydrologic system, model simulations and groundwater development plans including satellite well field, Metropolitan well field, pumpage for park and golf course irrigation and bedrock storage of municipal water Supplemental information includes historical pumpage estimates, future pumpage estimates and modeling errors and limitations An extensive use of maps accompany the report.

Rockwell Int'l., 1986a, Draft Work Plan-Geological and Hydrological Site Characterization, USDOE, RFP, Golden, Colorado. Source. RFP Library.

Work plan that describes the activities and tasks to be preformed at the Rocky Flats Plant in order to characterize site geology, hydrology and water quality Included is the initial site evaluation, its hydrogeologic setting, waste disposal activities, and prioritization of potential containment, and the nature and extent of contamination. The site characterization, topography, geology, ground water hydrology, surface water hydrology, sediments, and laboratory materials testing are discussed Work plan includes figures, tables and plates of Rocky Flats Plant, surficial geology, shallow and bedrock monitor well completion diagrams, graphic schedule, surface-water sampling parameters, monitor well locations, and locations of surface and sediment monitoring stations

Rockwell Int'l., 1987, Remedial Investigation Report for 903 Pad, Mound, and East Trenches Area, December 31, 1987, 11 vols. Source: RFP Library

Report illustrates the existence and location of the waste disposal sites, their characterization, evaluates the nature and extent of contamination and develops data needed for feasibility studies of remedial alternatives The three areas are the 903 Pad, Mound, and East Trenches area at the Rocky Flats Plant Volume I includes site locations and descriptions, previous investigation, the nature and extent of the problem and remedial investigation summary The regional setting and site features including the land use, natural resources, climatology, physiography, regional hydrogeologic setting and water resources are described Volume II is the characterization of the waste sources of the 3 areas Volume III describes the site hydrogeology including the surficial geology, bedrock geology, ground-water flow, and ground-water chemistry Volume IV describes the surface water, hydrology, surface water chemistry, sediments and flood potential. Also included are descriptions of the plants ambient air monitoring and sampling for radionuclides and the remedial investigation of the air sampling results The biota, its flora, wildlife and aquatic life of the area is evaluated Included are public health and environment concerns, potential receptors, public health impacts and environmental impacts Volume V reports on Phase 2 of the CEARP- Rocky Flats site specific monitoring plan, report of geophysical investigations of the 3 areas- soil gas survey data and description of drilling activities Volumes VI, VII, and VII, are the hydrogeologic data. Volume IX is the analytical chemistry and soils data Volume X describes the ground-water data, surface-water and sediment data and quality assurance Volume XI details biota data and RAAMP sampler summary data

Rockwell International, 1987, Remedial Investigation Report for High Priority Sites (881 Hillside Area), Prepared for the U.S. DOE, Rocky Flats Plant, Golden, Colorado, July 1, 1987, Vol. I-text and plates, Vols. II to V-Appendices. Source: RFP Library

Volume I presents results of a remedial investigation undertaken to verify the existence and location of waste disposal sites in the general vicinity of the 881 Hillside area, to characterize the site, to evaluate the nature and extent of contamination, and to develop data needed for feasibility studies of remedial alternatives as appropriate Discusses the Fountain, Upper Laramie, and Arapahoe Formations and the creeks of North and South Walnut, Woman, Coal, and Rock, and Leyden Gulch Volume II reports on the geophysical investigation, the soil gas survey, and drilling activities Volume III provides hydrogeologic data, volume IV presents analytical chemistry results, and volume V discusses quality assurance and biota

Rockwell Int'l., 1988, Feasibility Study Report for High Priority Sites (881 Hillside Area), March 1, 1988, Volume I and II. Source: RFP Library

Describes the result of the feasibility study of the high priority sites at Rocky Flats Plant Study proposes alternative remedial actions that eliminate or control environmental contamination at these locals Included are the nature and extent of the contamination, screening of remedial action technologies, initial screening of remedial alternatives, the detailed evaluation of remedial alternatives and recommendations Volume II assesses the potential human health and environmental risks at the 881 Hillside The risk assessment guidelines came from the Endangerment Assessment Handbook and the Superfund Public Health Evaluation Manual Steps were as follows selection of indicator chemicals, environmental release and transport, exposure evaluation, toxicity assessment and risk characterization.

Rockwell Int'l., 1988, Present Landfill Closure Plan, July 1, 1988, Appendix to the Post-Closure Care Permit of October 7, 1988

Report on the closure plan for the landfill at the Rocky Flats Plant Includes description of the construction and operations at the landfill both past and present Discusses decontamination procedures for equipment and the north sprayfield and the proposed closure design for the landfill which includes a multi-layer cover, ground-water and gas collection systems Security at the landfill and certification of its closure conclude this report.

Rockwell Int'l., 1986, Resource Conservation and Recovery Act Part, B-Operating Permit Application, Prepared for the U.S. DOE-Rocky Flats Plant, Section E, November 1986

Section E describes ground water monitoring and protection Provides a description of the hydrogeologic setting and the identification of the uppermost aquifer at Rocky Flats based on existing hydrogeologic data

Rockwell International, 1988, Resource Conservation and Recovery Act, Part B-Operating Permit Application, Transuranic Mixed Wastes, July 1, 1988, Prepared for the U.S. DOE-Rocky Flats Plant, Project No. C07890010526, vol. 1 which contains Section B. Source: RFP Library.

Applicable sections discuss site environment and climate (p B-2, B-6 to B-7), surface waters, drainage patterns, and controls (p B-28 to B-29), and seismic considerations and historic seismicity (p B-41 to B-54) Describes the geologic bench known as Rocky Flats as covered with a thin layer of gravely topsoil underlain by a 20 to 50 foot thick layer of coarser, clayey gravel with poor water holding capacity The western soils are very cobbly, stony sandy loams and clay loams in Hydrologic Group C, while the eastern soils are clayey with some cobbly clays in Hydrologic Group D Five creeks flowing on or near the Plant are--North and South Walnut, Woman, Coal, and Rock

Rockwell International, 1988, Resource Conservation and Recovery Act Post-Closure Care Permit, vol. 1, section E, October 5, 1988. Source: RFP Library.

Features regional and plant hydrology information--methods of ground water recharge for the Laramie-Fox Hills Aquifer and the Arapahoe Aquifer, and ground water directions and flow rates Covers plant site geology and stratigraphy, including discussion of the Laramie and Arapahoe Formations, and the lower sandstone unit and upper claystone unit. Includes graphics and plant area cross section

Rockwell International, 1988, Resource Conservation and Recovery Act Post-Closure Care Permit, vol. VI, appendix 6, section 5 (general geology), Oct. 5, 1988; and section 3 (site hydrology, solar ponds), 30 p. Source: RFP Library.

Section five describes regional surface picture and plant surficial geology specifying six Quaternary unconsolidated units (alluvium) and provides cross sections of formations and listing of GSA classifications for formations Discusses regional ground water hydrology--recharge/discharge conditions, ground water flow DxNs, bedrock flow systems, the Laramie-Fox Hills and Arapahoe Aquifers, and surface water hydrology--natural drainages and ditches Section three discusses site hydrogeology and solar ponds, including the surficial geology, bedrock geology, and ground water geology of solar ponds

Rockwell International, 1988, Resource Conservation and Recovery Act Post-Closure Care Permit, vol. VII, appendix 6, section 3, appendix B, October 5, 1988. Source: RFP Library.

Provides hydrogeologic data, boring logs, and aquifer test data

Rockwell Int'l., 1988, Solar Evaporation Ponds Closure Plan, Appendix to the Post-Closure Care Permit of October 5, 1988, (revision 2). Source: RFP Library.

A description of the Solar Evaporation Ponds, construction history, past and current use Includes maximum waste inventory, description of auxiliary equipment, and the final closure plan summary The closure plan for the solar evaporation ponds may be found at the Rocky Flats Area Office, Building 111, U S. Department of Energy. Includes discussion of the removal, treatment and disposal of wastes, liners, soils and ground-water monitoring

Rockwell International, 1988, West Spray Field Closure Plan, Volumes XII and XIII of the Post-Closure Care Permit Application of October 5, 1988, Two volumes (XII and XIII), No. CO7890010526. Source: RFP Library.

Volume VII describes the Rocky Flats Plant, its location and operator Describes the West Spray Field, its size, soil types and spray application procedures and policies The maximum extent of operation and area affected Summary of the final closure plan for the area, its objectives, plan, and schedule are described The closure plan will be kept at Rocky Flats area office, building 115, U S Department of Energy Volume VII also provides information concerning inventory disposal, material in treatment, soil testing and removal of contaminated soil, facility decontamination, waste containment system, monitoring operations, food chain crops, site security and closure certification Volume VIII provides chemical characterization of the ground water down gradient of the solar ponds at the interceptor trench, the contents of Solar Pond 207 B-North and soils at the West Spray Field Includes location of sampling points, sampling methodology, sample handling, and quality assurance/quality control

Rockwell International, 1989, Seismic Reflection Profiling of the Arapahoe Formation at the Rocky Flats Plant, Draft Report, U.S. Department of Energy, August 1989. Source: RFP Library.

Report on the shallow, high-resolution seismic reflection technique using seismic modeling Work to determine the feasibility of using this technique to answer detailed geologic question, optimize groundwater monitoring well placement, and verify results Field testing was done within the

parameters set and the results are presented in this report. Includes seismic data acquisition, data processing, interpretation of information, and recommendations.

Rojas, I. de, 1980, Stratigraphy of the Mowry Shale (Cretaceous), Western Denver Basin, Colorado, CSM Thesis T-2343, 148 p., 6 pl. Source: CSM Library Front Desk.

Study to interpret the characteristics of how the Mowry Shale, overlying the J Sandstone, was deposited and the depositional processes that controlled the sediment distribution in T 6 N to T 7 S, R 60 W to R 70 W. Discusses geology, marine sedimentation, and ash fall clay minerals Appendices include measured surface sections, subsurface core data, and X-ray diffraction patterns of ash falls and shales

Rosholt, J.N., 1980, Uranium-Trend Dating of Quaternary Sediments, USGS Open-File Report 80-1087. Source: USGS Library (200) R290, USGS distributes microfiche $3.50.

Presents experimental data from the development of a model to describe that part of a uranium migration whose end product is a predictable change of U-series isotopic ratios with time

Rutt, K.L., 1966, Report of Sampling Wells North of North Patrol Road (North of 90, 95) and East of Parking Lot (East of 25), 2 p.

Report subpoenaed by FBI.

Saiti, B.M., 1983, Regional Velocity Study of the Middle Cretaceous Stratigraphic Interval, Northern Denver Basin, Colorado, CSM, Geophysics Dept. Source: CSM Library.

Thesis examining the velocity as a function of depth in Cretaceous stratigraphic interval from the top of the Dakota J-Sandstone to the top of the Niobrara formation in the Northern Denver Basin. Report includes mapping of velocity anomalies which may exist due to the effect of the Transcontinental Arch Study area is the Denver Basin in northeastern Colorado and involves subsurface velocity data covering approximately 9,000 square miles.

Scanlon, A.H., 1982, Oil and Gas Fields in Colorado, Statistical Data Through 1981, Colorado Geological Survey Information Series 18, p. 1-72. Source: USGS Library (271) C3is.

Statistical data of all currently producing and abandoned oil and gas fields on record with the Colorado Oil and Gas Conservation Commission. Superior field in Boulder County was discovered in 1978, T 1 S, R 70 W Accompanies map series 22-Colorado Oil and Gas Fields

Schlocker, J., 1947, Clays of the Montmorillonite-Nontronite Group in Basaltic Rocks Near Golden, Colorado [Abs.], Geologic Society of America Bulletin, vol. 58 (July-December), p. 1225. Source: USGS Library G(200) G29.

An examination of basaltic rocks from a quarry at South Table Mountain near Golden to determine its suitability as a concrete aggregate revealed the presence of small amounts of an iron-bearing member of the montmorillonite group, nontronite The Ralston Dike, 4 miles northwest of the quarry and composed of similar rock was found to have clay minerals of the montmorillonite group also, especially in hydrothermally altered zones composed of nodules of hard, altered basaltic rock in a matrix of soft, decomposed material

Schmitt, James, G., and Hazen, David, R., 1986, Sedimentation of the Late Triassic Higham Grit in a South Saskatchewan/Platte River-Type Braided Stream Complex, Southeastern Idaho and Western Wyoming, The Mountain Geologist, vol. 24, no.1 (January, 1987) p. 1-9. Source: CSM.

Report addresses what depositional environments played a role in Higham accumulation, what processes of sediment transport were active during Higham deposition and if the depositional model derived for the Higham is compatible with the results of provenance studies Article describes geologic setting and details its lithofacies of each measured section Comparison of lithofacies types and sequences are made Information indicates the Late Triassic Higham Grit of southeastern Idaho and western Wyoming represents deposition by a South Saskatchewan/Platte River- type braided fluvial system Includes diagrams, models of Braided River Deposits, maps, photographs, and charts

Schneider, P.A., Jr., 1980, Water Supply Assessment of the Laramie-Fox Hills Aquifer in Parts of Adams, Boulder, Jefferson, and Weld Counties, Colorado, USGS Open-File Report 80-327, 21 p., 81-002. Source: USGS Library (200) R290, USGS distributes $13.50.

Reports on sources of recharge and discharge, aggregate sand and aquifer thickness, well yields, and water quality Covers the Erie, Lafayette, Louisville, Niwot, and Superior Quadrangles of the Front Range

Schoewe, W.H., 1930, Evidences of Stream Piracy on the Dakota Hogback Between Golden and Morrison, Colorado, Kans. Acad. Sci., Trans., vol. 31, p. 112-114. Source: CSM Library.

Briefly discusses the Dakota hogback located between Golden and Morrison This hogback is described as being continuous without a break for the four and one half miles between Golden and Morrison There exists a prominent gap in the ridge and a study of its materials indicates that a stream formerly flowed through the gap The abandonment of the gap by the stream appears to be caused by a change in the streams course due to stream piracy Includes brief historical explanation

Scott, G.R., 1960, Quaternary Sequence East of the Front Range Near Denver, Colorado, In Guide to the Geology of Colorado, Geologic Society of America, Rocky Mountain Association of Geologists, and Colorado Scientific Society, Weimer, R.J., and Haun, J.D., (eds)., p. 206-211. Source: USGS Library G(200) G29gf.

Discusses the soils, geomorphology, and stratigraphy (including Rocky Flats alluvium) of the Kassler and Littleton Quadrangles Correlates the Quaternary deposits to geomorphic development

Scott, G.R., 1960, Subdivision of the Quaternary Alluvium East of the Front Range Near Denver, Colorado, Geol. Soc. America Bull., vol. 71, no. 10, p. 1541-1543. Source: USGS Library G(200) G29.

Discusses the recognition and differentiation of alluvial formations near Denver including the Rocky Flats, Verdos, Slocum, Louviers, Broadway, and Recent

Scott, G.R., 1965, Nonglacial Quaternary Geology of the Southern and Middle Rocky Mountains, In The Quaternary of the United States, Wright, H.E., Jr., and Frey, D.G., eds., Princeton Univ Press, Princeton, NJ, p. 243-254. Source: USGS Library 352(200) qw932q.

Paper on the piedmont east of the Front Range and the principal basins within the Rocky Mountains in Colorado, Wyoming, and southwestern Montana. Summarizes the Quaternary geology

Scott, G.R., 1970, Quaternary Faulting and Potential Earthquakes in East-Central Colorado, USGS Prof. Paper 700-C, p. C11-C18. Source: USGS Library.

Eight faults (Texas Creek, Rampart Range, Golden, Valmont, and Sangre de Cristo, and faults near Fowler and Cheraw) with evidence of Quaternary movement were studied to establish their net Quaternary vertical offset, length of Quaternary displacement, geologic setting, best estimate of time of last movement, and correlative historic seismicity to evaluate the likelihood of future fault movement and earthquake generation. Thirty-one earthquakes of magnitudes less than four were recorded at or near the Golden Fault in 1967

Scott, G.R., 1975, Cenozoic Surfaces and Deposits in the Southern Rocky Mountains, In Cenozoic History of the Southern Rocky Mountains, Curtis, B.F., ed., Geol. Soc. America Memoir 144, p 227-248. Source: USGS Library G(200) G29me.

Describes Tertiary and Quaternary erosion surfaces, surface formations, and criteria for recognition, differentiation, and age estimation.

Sheldon, N., 1988, Age of the Dawson Arkose, Southwestern Air Force Academy, Colorado, and Implications for the Uplift History of the Front Range, The Mountain Geologist, vol. 25, no 1, p.29-35. Source: CSM.

Report on work done on the Southwestern part of the Air Force Academy, Colorado Springs, Colorado, along the eastern side of the Front Range uplift. Seen as a good area to study the age of deformation along that part of the structural front because the rocks near the angular unconformity within the Dawson Arkose in that area contain a rich palynomorph assemblage Report interprets the geology and age of the Dawson Arkose Findings indicate that 30-40 degrees of tilting, associated with faulting and uplift of the eastern margin of the Front Range, at the Air Force Academy took place during a short time period of the late Maestrichtian and 25-35 degrees of additional tilting took place during very late Maestrichtian and/or during Early Tertiary

Sheridan, D.M., 1953, Ralston Buttes District, Colorado, USGS Trace Elem. Invest. Rpt. No TEI-390, p. 107-110, sketch map. Source: CU Library- Gov't Documents.

Discusses the finding of Pitchblende and secondary uranium minerals in the Ralston Butte Quadrangle, Jefferson County, Colorado States the plan to map the area and search for additional deposits of uranium and to study the petrology and mineralogy of the county rocks and ores Includes index map of the Ralston Buttes Quadrangle

Sheridan, D.M., 1954, Ralston Buttes District, Colorado, USGS Trace Elem. Invest. Rpt. No. TEI-440, p. 88-89, sketch map. Source: CU Library- Gov't Documents.

Progress report for period States shipments of Pitchblende that were made and states where new deposits of uraniferous material were found in the Ralston Creek area Report includes index map of the Ralston Buttes Quadrangle

Sheridan, D.M., 1955, Ralston Buttes District, Colorado, USGS Trace Elem. Invest. Rpt No. TEI-490, p. 139-141, sketch map. Source: CU Library- Gov't Documents.

Reports that Ralston Butte district is becoming important as a potential source of pitchblende, some containing uranium States all significant occurrences of pitchblende found at the time were associated with base metal sulfides in or near carbonate-bearing fault breccias of probable Tertiary age Includes index map of Ralston Butte Quadrangle

Sheridan, D.M., 1956, Ralston Buttes District, Colorado, USGS Trace Elem. Invest. Rpt No. TEI-540, p. 142-143, sketch map. Source: CU Library- Gov't Documents.

See above In addition, reports on plans for the compilation of the results of findings into a USGS bulletin Gives synopsis of field work done in one month period, including pit examined, area mapped and current status of area.

Sheridan, D.M., Maxwell, C.H., and Albee, A.L., 1967, Geology and Uranium Deposits of the Ralston Buttes District, Jefferson County, Colorado, with Sections on Paleozoic and Younger Sedimentary Rocks by Richard Van Horn, USGS Prof. Paper 520, 121 p. Source: USGS Library.

Study of the geology and uranium deposits (Ralston Creek and Golden Gate Canyon) in a 57 square mile area in N W Jefferson County between Coal and Clear Creeks Describes the Quaternary surficial deposits of thick gravel which mantle pediments in the N E part of the district, and their deposits of alluvium, which mask the bedrock in most of the valleys Ninety percent of the bedrock is precambrian metamorphic and igneous rocks overlain by sedimentary rocks of paleozoic and mesozoic age Alluvium deposits of the area include Verdos, pre-Rocky Flats, and Rocky Flats found in T 2 S to T 3 S, R 70 W

Shuck, E.L., 1976, A Seismic Survey of the Ralston Area, Jefferson County, Colorado, CSM Thesis T-1835, 45 p. Source: CSM Library Front Desk.

Report on a multifold seismic reflection survey to identify subsurface information about the Ralston area (T 3 S, R 70 W, sections 4, 5, and 9) that is largely covered with Quaternary colluvium and Rocky Flats alluvium Discusses geology, survey procedures and results, drape-folding of the Fox Hills and Laramie Formations, and features of the Golden Fault and area surrounding Ralston dike

Simon, R.B., 1968, The Denver Earthquakes, 1962-1967, Earthquake Notes, vol. 39, no. 1-2, p. 37-40 Source: USGS Library S(200) Se46e.

Study on earthquakes, azimuthal distribution, and possible fault mechanism in the Denver-Derby area

Simon, R.B., 1969, Seismicity of Colorado; Consistency of Recent Earthquakes with Those of Historical Record, Science, vol. 165, no. 3896, p. 897-899. Source: USGS Library.

Notes that earthquakes instrumentally recorded from 1966 to 1968 have occurred in the same regions of western Colorado in the Arkansas and Platte River valleys, as those that were reported in the newspapers as far back as 1870. It appears unnecessary to explain Denver's earthquakes in terms of pressure induced by the introduction of waste fluid by the Rocky Mountain Arsenal since the assumption of preexistent tectonic strains in the area of the Arsenal seems to be confirmed

Simon, R.B., 1972, Seismicity of Colorado, 1969-1970-1971, Earthquake Notes, vol. 43, no. 2, p. 5-12. Source: USGS Library S(200) Se46e.

Discusses epicentral locations and the number of events at each location for 1969, 1970, and 1971

Simpson, H.E., 1985, Topographic, Geologic, and Engineering Geologic Mapping in the Denver Metropolitan Region, Denver Regional Council of Governments. USGS Library.

Report on basic information about available maps Includes topographic, geologic, engineering geologic quadrangle maps, earth-science maps, all of the Denver Metropolitan area Bibliography and lists of sources where maps may be obtained is also included Information was prepared for the Denver Regional council of Governments as part of an engineering geologic mapping project.

Sims, P.K., and Sheridan, D.M., 1964, Geology of Uranium Deposits in the Front Range, Colorado (Includes Sections by King, R.U., Moore, F.B., Richter, D.H., and Schlottmann, J.D.), USGS Bulletin 1159, 116 p. Source: USGS Library (200)M, not avail. for purchase.

Describes the general geology of the Front Range including Precambrian and sedimentary rocks and faults, distribution and mineralogy of uranium deposits, and the location and description of principal mines in Boulder, Clear Creek, Gilpin, and Jefferson Counties

Smithson S.B., Brewer J., Kaufman S., Oliver J., and Hurich C., 1978, Question of the Wind River Thrust, Wyoming, Resolved by Cocorp Deep Reflection Data and by Gravity Data, Resources of the Wind River Basin, Third Accual Field Conferance, p. 227-234. Source: CSM Library.

Deep crustal seismic reflection profiles across the Wind River Mountains at South Pass in Wyoming are used to interpret a major Laramide structure The Wind River Thrust can be traced on seismic reflection profiles to a depth of at least 24 km showing an average dip of 30-35 degrees Thus, the Laramide uplift is the result of extensive horizontal compression with almost twice the horizontal displacement than vertical displacement.

Soister, P.E., and R.H. Tschudy, 1978, Eocene Rocks in Denver Basin, Rockt Mountain Association of Geologists - Symposium, p. 231-235. Source: CSM Library.

Discusses that the findings of pollen samples, together with regional mapping and drill-hole studies indicate a thickness of Eocene rocks in the Denver basin of as much as about 300 m The Eocene rocks comprise the main body of the Dawson Arkose A Prominent palesol underlies the Eocene fossil-bearing across most of the basin. The lower part of the Dawson arkose was radiometrically dated which indicated an age close to the Paleocene-Eocene boundary

Soister P.E., 1978, Stratigraphy of Uppermost Cretaceous and Lower Tertiary Rocks of the Denver Basin, Rocky Mountain Association of Geologists - Symposium, p. 223-230. Source: CSM Library.

Discusses the stratigraphy, thickness, and the relative locations of the Laramie, Arapahoe, Denver, and Dawson Formations

Sonido, E.P., 1959,Gravity Survey of the Golden-Morrison-Denver Area, Colorado, CSM Theisis T-864, p. 47. Source: CSM Library Front Range.

Gravity survey for an area of about 535 square miles in north-central Colorado, covered by the quadrangles of Louisville, Golden, Ralston Buttes, Eldorado Springs and others Provides computations for Free-Air, Bougeur, and isostatic anomalies Geology is not covered

Sonnenberg, S.A., 1981, Tectonics, Sedimentation, and Petroleum Potential, Northern Denver Basin, Colorado, Wyoming, and Nebraska, CSM Quarterly, vol. 76, no. 2., p. 1-45. Source: USGS Library S(271) C78.

Generalized stratigraphic analysis of Paleozoic and Mesozoic strata in about 30,000 square miles of the northern Denver Basin which shows that recurrent movement on basement faults influenced sedimentation, especially during major sea level changes

Stahl, R.L., 1974, Detection and Delineation of Faults By Surface Resistivity Measurements, Schwartzwalder Mine, Jefferson County, Colorado, U.S. Bur. Mines Rpt. Inv., no. 7975, 27 p. Source: USGS Library 402(200) Un34ex.

Conduct of comprehensive field tests at Schwartzwalder Mine to determine whether surface geophysical techniques could be used to detect and delineate faults in uranium deposits Tests include seismic refraction, magnetometer, electrical resistivity, airborne infrared scanning, and airborne photography

Stewart, W.A., 1953, Structure and Oil Possibilities of the West Flank of the Denver Basin (Jefferson County), North-Central Colorado, CSM Thesis T-777, 121 p., 3 plates. Source: CSM Library Front Desk.

Results of a geologic and seismic survey undertaken along a portion of the west flank of the Denver Basin in the vicinity of Denver to determine the regional, subsurface, and structural fabric of the basin flank and to relate it to surface features exposed in the foothills belt west of Denver Explains that the Arapahoe Formation consists of those sediments included between the base of a 100 foot conglomerate of chert, flint, jasper, quartz, and limestone pebbles and is succeeded by a sequence of light gray to buff, arenaceous shales, siltstones, and sandstones which contain increasing amounts of hornblende and augite toward the top of the section. Identifies nine known occurrences of bituminous material in the foothills belt between Ralston Reservoir and Dutch Creek One such occurrence is found about 15 feet above the Lyons-Lykins contact on Ralston Creek

Stewart, W.A., 1955, Structure of the Foothills Area West of Denver, Colorado, In Rocky Mtn. Assoc. of Geol., Field Conference Guidebook, p. 25-30. Source: USGS Library.

Discusses the foothills monocline, thrust faulting, and folding

Taylor, R.B., 1975, Neogene Tectonism in South-Central Colorado: In Curtis, B.F., ed., Cenozoic History of the Southern Rocky Mountains, Geol. Soc. America Mem. 144, p. 179-226 Source: USGS Library G(200) G29me.

Describes Neogene block faulting as a locally important geologic feature

Tharalson, D.B., 1966, Heavy Minerals in Recent Alluvium Along the Eastern Flank of the Front Range, Golden to Canon City, Colorado, Univ. of CO Thesis T-1966. Source: Univ. of CO Library T327 C.1.

Study of the area from Golden to Canon City (bounded by Bear Creek and its tributaries on the north and the Arkansas River on the south) to determine heavy mineral assemblages of Recent Alluvium sediments and to compare their mineralogy with that of sediments of late Paleozoic age which were derived from the same types of source rocks

Thompson, R.W., 1973, Soils and Foundation Investigation, Addition to the Sewage Treatment Plant, Atomic Energy Commission Rocky Flats Plant, Jefferson County, Colorado, Prepared for Meurer, Serafini, Meurer Consulting Engineers, Job No. 1085, 7 p. Source:

PRIVATE (Ron McOmbre, CTL/Thompson, 825-0777, 1971 W 12th Ave at 12th & I-25, Directions I-25 N from Englewood, 8th Ave exit-go straight-becomes I-25 exit ramp-right on Yuma which becomes 12th)

ALSO SEE CTL/THOMPSON.

Thompson, W.O., 1949, Lyons Sandstone of Colorado Front Range, American Association of Petroleum Geologists Bulletin., vol. 33, no. 1, p. 52-72. Source: USGS Library G(200) Am3.

Describes in detail the original structures of the Permian Lyons sandstone of the Front Range Includes sedimentation study and cross sections

Tieje, A.J., 1923, **The Red Beds of the Front Range in Colorado; A Study in Sedimentation, Jour. Geol., vol. 31, p. 192-207. Source: USGS Library G(200) J83.**

Report on the "Red Beds" of the Fountain, Lyons, and Lykins Formations and their time-equivalents east of the Continental Divide Describes the conditions under which the sediments were laid down

Tollefson, O.W., 1942, Structure of the Foothills Region from Gregory Canyon to the Southern Boulder County Line, Colorado, Univ. of CO Thesis. Source: CU Library- Archives.

Investigation to determine the attitude and dip of the faults through Green Mountain, South Boulder Peaks and Eldorado Mountain and to determine what effect these faults have had on the various formations of the area. Presents evidence that the faults are high angle, east-dipping faults with the east blocks, upthrown with reference to the west blocks Includes location and size of the region, physiography, regional and local stratigraphy, geologic structure and analysis of the structural forces Includes geologic map and series of illustrations in the form of photographs.

Trexler, D.W., and Moore, F.E., 1972, Geology of the Denver Mountain Area, Red Rocks Park to Lookout Mountain to Boulder, AAPG Field Trip 1, In Tertiary and Cretaceous Resources of the Southern Rocky Mountains, Mountain Geologist, vol. 9, no. 2-3, p. 72-78. Source: USGS Library G(200)M 864., not avail. for purchase.

Field trip discussion and maps on the geology of the Golden-Morrison and Golden-Boulder areas

Trimble, D.E., Scott, G.R., and Hansen, W.R., 1980, Mountains and Plains, Denver's Geologic Setting, USGS (sold by GPO). Source: CU Library.

A description of the geologic events that shaped the landscape Describes Denvers local, the valley, the foothills, how the rocks were formed, including a road log describing geologic features West of Denver and at the Red Rocks Park. Included in this leaflet are maps, diagrams, photographs, and charts detailing the descriptions.

Tweto, O., 1975, Laramide (Late Cretaceous-Early Tertiary) Orogeny in the Southern Rocky Mountains, Geological Society of America, memoir 144, p. 1-38. Source: CSM

Article describes evidence for the post-Laramide development of the Southern Rocky Mountains The Laramide development is applied to orogenic events that occurred between late Campanian Cretaceous and late Eocene time. The general features of the Southern Rocky Mountains are discussed along with its Paleotectonic setting The Laramide orogeny produced several mountain units and several major sedimentary and structural basins Each of these are discussed in detail with emphasis on their sedimentary record Included is description of the igneous record, early Laramide timing constraints, orogenic sequence and structural development, the close of the Laramide orogeny and tectonic and magmatic patterns for the Southern Rocky Mountains

Tweto, O. and Sims, P.K., 1963, Precambrian Ancestry of the Colorado Mineral Belt, Geol. Soc. America Bull., Vol. 74, no. 8, p. 991-1014. Source: ESCI Library - CU.

Documents the Precambrian shear zones and the genetic relation of the mineral belt to them The mineral belt, which is the strip from the mountain front near Boulder to the region of the San Juan mountains contains all the major mining districts of Colorado except uranium districts near the border The shear zones helped to localize the belt and had an active part in its origin States that the magma body which was localized due to the system of shear zones appeared in the Laramide time but most of the recorded shearing movement took place in the Precambrian time. Included is a description of the geologic setting, the extent of the mineral belt, the Precambrian structure related to the mineral belt, other descriptions of shear zones, Precambrian faults in the Front Range, and age relations which discusses the questions over when the features developed in time Included are maps of the metal-mining areas and map of Precambrian tectonic features, pattern of shear zones and a shape and extent of the Colorado mineral belt.

U.S. Geol. Survey, 1968, Mineral and Water Resources of Colorado, CO Geol. Survey MI 7, 302 p., 49 figs., 44 tables. (Senate Document No. 115.) Source: CU Library.

Reports on the supply of minerals and water in Colorado at the time Includes a projection of the supplies available for future production and consumption Information is presented in nontechnical language when possible so as may be used by everyone Introduction includes a general description of the geology of Colorado and generalized geologic and structural maps The mineral industry section includes a brief historic sketch of the area, and a separate section for each mineral commodity, i e coal, oil and gas, oil shale, precious and base metals, ferrous metals, etc When applicable, the principle use of the commodity is given, a review of its production and relative importance, and gives an appraisal of the resources and outlook. Maps indicating the distribution of deposits and occurrences in Colorado is included Quantity, quality, and distribution of surface and ground water supplies are discussed in the section on water resources Includes what was being utilized at the time of report and those that might be available for development. Further information is given in maps, graphs, and tables

U.S. EPA, 1981, Manual of Groundwater Sampling Procedures: Scalf, M.R., McNass, J.F., Dunlap, W.T., Cosby, R.L., and Fryberger, T. Source: CU Library.

Presents procedures currently used to sample ground water and subsurface earth materials for microbial and inorganic and organic chemical parameters The objectives of the program, is to help determine the sampling procedure and may vary accordingly Some considerations may be the characteristics of pollutants, nature of pollution source and hydrogeology of the area Described are methods for constructing sampling wells and for the withdrawal of the samples Procedures are described for collecting, handling, and processing core samples Also discussed is the preservation of samples, the sample records, and chain of custody procedures A series of diagrams are used to help illustrate more clearly, soil layers, aquifer flow, and drilling mechanisms

Vanderwilt, J.W., 1947, Mineral Resources of Colorado (With County Summaries), CO Geol. Survey MI 1, 547 p., 43 figs., tables, 1 pl. Source: USGS Library 403(271) C71M, USGS distributes microfiche $8.

Comprehensive summary of mineral resources in Colorado that covers topography, climate, geology, metals, nonmetals, nonmetallic minerals, coal, petroleum, and oil shale by county Notes that placer gold occurs along Clear Creek in Jefferson County in T 3 S, R 69 W to R 70 W In Boulder County, many active mines are present, the majority of which produce small lots of ore in veins of granite and schist of Precambrian age Also, Tertiary dikes and stocks, and in places premineral fault zones, are structurally important source zones in Boulder County

Van Hise, C.R., 1892, Correlation Papers, Archean and Algonkian, USGS Bulletin 86, p. 308-325 Source: USGS Library (200)M, not avail. for purchase.

States that the greater parts of the Front, Wet, Sawatch, Park, and Quartzite ranges and the crystalline rocks of the Gunnison and Grand are a completely crystalline complex of rocks which are certainly Precambriam The districts of South Boulder, Coal and Ralston Creeks contain Precambrian clastics

Van Horn, R., 1954, Landslides Near Golden, Colorado, Engineers Bull., vol. 38, no. 12, p. 6, 15. Source: CSM Library.

Report on potential landslides in the vicinity of Golden, Colorado The history of slides helps to indicate the type and magnitude of landslides characteristic for the area Article discusses these landslides dating back to 1914

Van Horn, R., 1954, Ralston Creek Formation, A New Name for the Ralston Formation of LeRoy (1946) [Colorado], Am. Assoc. Petroleum Geol. Bull., vol. 41, no. 4, p. 755-756. Source: USGS Library G(200) Am3.

Recommends renaming the Ralston Formation LeRoy to Ralston Creek Formation to accommodate two other like formations in existence at the time of naming the first formation The Ralston Creek Formation of late Jurassic age consists of varicolored claystone, siltstone, and limestone, and contains thin beds and disseminated nodules of moderate red to dark gray chalcedony It is overlain by the

Morrison Formation and underlain by the Lykins Formation A Type section is on the south side of Ralston Creek in NW 1/4, SW 1/4 sec 5, T 3 S, R 70 W

Van Horn, R., 1976, Geology of the Golden quadrangle, Colorado: With Emphasis on Deposits of Pliestocene Age and Their Economic Potential, Engineering Characteristics, and Environmental Implications, USGS Prof. Paper 872, 116 p. Source: USGS Library, USGS distributes $3.65

Comprehensive geologic study of physiography, stratigraphy, structural features, history, economics, and engineering (see accompanying USGS map I-761-A) Provides an in-depth description of the Arapahoe and Denver Formations present in the southern part of the quadrangle (p 35-47) Discusses Quaternary deposits of alluvium (including Rocky Flats), colluvium, loess, transported mantle, artificial fill, and landslides (p 53-79) Includes chart showing pebble count, size, and longitudinal stream and terrace profiles of alluvial deposits for Clear, Van Bibber, Ralston, and Leyden Creeks, and Tucker Gulch

Van Sant, J.N., 1959, Refractory-Clay Deposits of Colorado, U.S. Bur. Mines Rpt. Inv. 5553, 156 p. Source: USGS Library 402(200) Un34ex.

Report on the occurrence, mining, and use of refractory clay in Colorado within Region III of the Federal Bureau of Mines Examines active and abandoned mines as well as performs a reconnaissance survey and sampling of numerous exposed clay bearing formations Most refractory clay mined in the Denver-Golden districts is not used for refractory purposes but is blended with other clays in the manufacture of structural clay products The following locations are provided for clay mines, prospects, and outcrops in Jefferson County within T 2 S, R 70 W SW 1/4 sec 6, NW 1/4 sec 18, secs 30 and 19, SW 1/4 sec 29, NW 1/4 sec 32, and SE 1/4 NW 1/4 sec 32

VanSlyke, G., Romero, J., and Wacinski, A., 1986, Aquifer Data from Geophysical Logs, Denver Basin, Colorado, Basic Data Report 1, Office of the State Engineer, Colorado Division of Water Resources, text p. 1-12, data p. 13-67. Source: CO Div. of Water Resources $8.

Briefly describes the Denver Basin (approximately 6,700 square miles) and the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers, and lists interpretative data for over 2,400 geophysical logs of oil, gas, and water wells in the Denver Basin Includes geophysical log files for sections in T 1 S to T 3 S, R 69 W to R 70 W The data was compiled to assist in the formulation of rules and regulations on the withdrawal of ground water Data covers well location, surface elevation, elevation of tops and bases of aquifers identified on each well log and total thicknesses of sandstones and siltstones

Van Tuyl, F.M., and Lovering, T.S., 1935, Physiographic Development of the Front Range, Geol. Soc. America Bull., vol. 46, no. 9, p. 1291-1350. Source: USGS Library G(200) G29

Discusses the physiographic development of the Front Range, describes and correlates the Tertiary erosion surfaces of the peneplains of Flattop, Green Ridge, Cheyenne Mountain, Overland Mountain, and Bergen Park, and the berms of Flagstaff Hill, Mount Morrison, and Orodell, and explains the modifying effects of alpine glaciation, Quaternary terraces, deformation of erosion surfaces, and age relations

Van Tuyl, F.M., Johnson, J.H., Waldschmidt, W.A., Boyd, J, and Parker, B.H., 1938, Guide to the Geology of the Golden Area, CSM Quarterly, vol. 33, no. 3, 32 p. Source: USGS Library S(271) C78.

Update of J.H Johnson's 1934 field handbook on the general geology of the Golden area that extends to Ralston Creek on the north.

Visher, Glenn, S., 1972, Physical Characteristics of Fluvial Deposits, Recognition of Ancient Sedimentary Environments SEPM Special Publication, no. 16, February, p.84-97. Source: CSM.

Relates the characteristics of fluvial deposits to the geomorphic and hydraulic processes that are responsible for their formation. Discussion includes description of a series of fluvial models, physical aspects of fluvial deposits, and genetic implications of fluvial processes

Waage, K.M., 1952, Clay Deposits of the Denver-Golden Area, Colorado, Colorado Scientific Society Proceedings, vol. 15, no. 9, p. 373-390. Source: USGS Library S(271) C86.

Report on the mining of approximately 280,000 tons of clay and shale in Jefferson and Douglas Counties for use in the clay-products industries of the Denver-Golden area The clay supply comes from at least nine different geologic formations but the principal clay-producing formation is the Laramie The lower clay beds of the Laramie have been extensively mined between State Highway 72, near Coal Creek and the Alameda Parkway west of Denver The second most extensive workings in clay in the Laramie Formation are the open pit and mines along the sharp hogback formed by lower sandstone beds of the Laramie between the Denver and Rio Grande Railroad tracks and the head of Leyden Gulch. Absence of clay of refractory grade in the Glencairn shale member north of Coal Creek appears to be coincident with a major change in facies within the member

Warner, L.A., 1956, Tectonics of the Colorado Front Range, 1956 Geological Record, American Association of Petroleum Geologists Rocky Mtn. Section, Denver, Colorado, p. 129-144. Source: USGS Library G(200) Am33g.

Provides brief account on the development of the Front Range and related parts of the Colorado Rockies in terms of their regional tectonic environment. The tectonic pattern in Colorado and Wyoming is complex, three regional trends, or lineaments, are recognizable Discusses the Pre-laramide tectonic history-Precambrian, early and middle Paleozoic, late Paleozoic, and Mesozoic, Laramide deformation, thrusting, transcurrent faulting, en echelon folds, and comments on the origin of the Laramide structure

Weimer, R.J., 1973, A Guide to Uppermost Cretaceous Stratigraphy, Central Front Range, Colorado: Deltaic Sedimentation, Growth Faulting, and Early Laramie Crustal Movement, Mountain Geologist, vol. 10, no. 3, p. 53-97. Source: USGS Library G(200)M 864, not avail. for purchase.

Study of late Cretaceous stratigraphic and structural history based on four outcrop sections along a north-south distance of 25 miles from highway I-70 to Golden, Leyden, and White Rocks (7 miles northeast of Boulder) Contains generalized bedrock map for the area west of Denver, Cretaceous stratigraphy map of the central Front Range, and sedimentation and tectonics discussions

Weimer, R.J., 1976, Cretaceous Stratigraphy, Tectonics, and Energy Resources, Western Denver Basin, In Studies of Colorado Field Geology, CSM Prof. Contributions no. 8, p. 180-227. Source: USGS Library S(271) C78pc.

Examines the Cretaceous outcrops along the west margin of the Denver Basin and discusses the stratigraphic models and associated energy resources--coal, petroleum, and uranium Summarizes the diagnostic characteristics of the upper Pierre shale and Fox Hills sandstone, looks at the Arapahoe and Denver Formations, and fault patterns. Includes general bedrock geology map, general stratigraphic section for the Golden-Morrison area, structure cross section along Leyden Gulch, and lithologic descriptions.

Weimer, R.J., 1980, Recurrent Movement on Basement Faults, a Tectonic Style for Colorado and Adjacent Areas, CO Geology, Rocky Mtn. Assoc. of Geol. Source: USGS Library G(271) R59f.

Presents data from the northwest margin of the San Juan Dome, Canon City, and Wattenburg gas area with emphasis on a tectonic pattern of recurrent and sporadic movement during or after deposition

Weimer, R.J., and Tillman, R.W., C 1980, Tectonic Influence on Deltaic Shoreline Facies, Fox Hills Sandstone, West-Central Denver Basin, CSM Prof. Contributions, vol. 1, no. 10, 131 p. Source: USGS Library S(271) C78pc.

Describes sedimentation, paleogeography, structures, petrology, and stratigraphy for parts of Jefferson, Boulder, Weld, and Adams Counties. Discusses the Fox Hills sandstone in the west-central flank of the Denver basin where listric-normal growth faults caused an abnormal thickness of shoreline deposits to accumulate during the Cretaceous Maestrichtian stage Reports on the Laramie Formation, Front Range Uplift, regression, growth faults, cyclic processes, Laramide orogeny, and well logs Includes stratigraphic model, paleogeographic maps, tables, geologic cross sections, and geologic sketch map

Weimer, R.J., and Davis, T.J., 1979, Stratigraphic and Seismic Evidence for Late Cretaceous Growth Faulting, Denver Basin, Colorado, CSM 930385 79-14122, p. 277-299. Source:

Interpretation of 250 miles of reflection seismic data in conjunction with surface maps and well data along the east flank of the Denver Basin (T 3 N to T 2 S, R 71 W to R 67 W) that reveals two distinct types of Late Cretaceous faulting--an early Laramide and a new Rocky Mountain tectonic style Discusses geologic structure and stratigraphy, seismic investigation data, the new tectonic style, and applications to petroleum exploration

Wells, J.D., 1967, Geology of the Eldorado Springs Quadrangle, Boulder and Jefferson Counties, Colorado, USGS Bulletin 1221-D, 85 p. Source: USGS Library (200)M, not avail. for purchase.

Reviews the petrography, stratigraphy, and structural geology of the Precambrian metamorphic and igneous rocks, Paleozoic and Mesozoic sedimentary rocks, ad the cenozoic surficial deposits

Wheeler, W.W., and Associates, Inc., 1972, Report on Hydrologic Investigations-Rocky Flats, Job no. 4410-210-980-106, prepared for C.F. Braun and Company, Contract no. AT (29-2)-2996. Source: W.W. Wheeler and Associates, Inc.

Results of a hydrologic study to determine the magnitudes of floods to be expected under extreme conditions at various points near the proposed construction of a Plutonium Recovery Facility at the Rocky Flats Plant. Areas studied were the drainage basin of Walnut Creek above the northwest Perimeter Road, the drainage basin above the proposed flood runoff diversion canal between coordinates N 36,500 to N 37,500+, E 17,500; the drainage basin below the diversion canal to the plant area, and the drainage along the plant access road. Includes analyses of water supply for cooling and dispersion and dilution characteristics of the system, appendix by Dr Robert A Clark on the storm potential up to and including the probable maximum

Wilmarth, M.G., 1938, Lexicon of Geologic Names of the United States, U.S.G.S. Bulletin 896, 2 parts, p. 2396. Source C.S.M.

Lists officially recognized formations and their ages, gives the chronologic sequence of investigation leading to then current formation lithologic description, stratigraphic position, areal extent, and type area

Wilson, W.W., 1965, Pumping Tests in Colorado, Colorado Water Conservation Board, Colorado Ground Water Circ. 11 (prepared by USGS), 361 p. Source: USGS Library 490(271) qC71c.

Examines and analyzes ground water data and presents results in graphical form to show pumping rates, drawdown, and recovery measurements, depths of wells, pretest water levels, thickness of saturated materials, specific capacities, and aquifer designations Shows data for sections of basins containing the Arkansas River, Colorado River, Kansas River, Platte River, and the Rio Grande River

Woodward-Clyde Consultants, 1987, Spray Irrigation Facility, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 22050-350. Source: Woodward-Clyde Consultants.

Results of geotechnical studies for developing geotechnical and geohydrological design criteria for proposed spray irrigation facility. Includes summary of laboratory test results, hydraulic loading rates, test hole and field permeability test locations, summary logs of test holes, gradation analysis, swell-consolidation test results, gradation and compaction test results

Woodward-Clyde Consultants, 1986, Geotechnical Services for Seismic Retrofits on Buildings 707, 779, and 776/777 at Rocky Flats Plant, Jefferson County, Colorado, Prepared for EQE, Job no. 21918-350. Source: Woodward-Clyde Consultants.

Study to evaluate engineering characteristics of foundation soils and rocks and to develop criteria for foundation design for structural modifications Discusses general geology, subsoils, and ground water Includes summary of laboratory test results, test hole locations and top of bedrock contours, summary logs of test holes, and swell-consolidation test results

Woodward-Clyde Consultants, 1986, Geotechnical Investigation, Addition to Building 121, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21863-350. Source: Woodward-Clyde Consultants.

Study to evaluate engineering characteristics and to develop criteria for foundation types and design for proposed facility addition. Includes summary of laboratory test results, test hole locations, and summary logs of test holes

Woodward-Clyde Consultants, 1986, Geotechnical Investigation, Addition to Building 374, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21862-350. Source: Woodward-Clyde Consultants.

Study to evaluate engineering characteristics and to develop criteria for foundation types and design for proposed facility addition. Includes summary of laboratory test results, test hole locations, summary logs of test holes, and gradation analysis

Woodward-Clyde Consultants, 1986, Geotechnical Investigation, Addition to Building 889, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21846-350 Source: Woodward-Clyde Consultants.

Study to evaluate engineering characteristics and to develop criteria for foundation types and design for proposed facility addition. Includes summary of laboratory test results, test hole locations, and swell-consolidation test results

Woodward-Clyde Consultants, 1985, Phase I Engineering Services, Consolidated Environmental Projects, Rocky Flats Plant, Golden, Colorado, Prepared for Merrick and Company, Job no. 21616-350. Source: Woodward-Clyde Consultants.

Reports on the bedrock geology in the Rocky Flats area including discussion of the Arapahoe, Laramie, Fox Hills, and Pierre Formations, Rocky Flats Alluvium, the Eggleston Fault, and site hydrogeology including the Arapahoe Aquifer, Great Western Reservoir, South Platte River, and domestic irrigation wells Includes graphics on site and regional hydrogeology

Woodward-Clyde Consultants, 1985, Geotechnical Investigation, Plutonium Recovery Plant Storage Tanks, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21595-350. Source: Woodward-Clyde Consultants.

Study to evaluate engineering characteristics and to develop criteria for foundation types and design for proposed facility addition. Includes summary of laboratory test results, location and summary logs of test holes, typical pressuremeter test plot, gradation analysis, swell-consolidation test results, and pier deflection vs diameter

Woodward-Clyde Consultants, 1985, Geotechnical Services, Building 779 Expansion, Rocky Flats Plant, Near Golden, Colorado, Prepared for Merrick and Company, Job no. 21550-350. Source: Woodward-Clyde Consultants.

Evaluation of foundation alternatives and design criteria for proposed facility addition. Includes summary of laboratory test results, location and summary logs of test holes, gradation analysis, and swell-consolidation test results

Woodward-Clyde Consultants, 1984, Geotechnical Investigation, East Access Gate and Access Road, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21487A-350. Source: Woodward-Clyde Consultants.

Study on foundation types for building, geotechnical design criteria, and pavement design and percolation rates Includes summary of laboratory test results, location and summary logs of test holes, gradation analysis, swell-consolidation test results, and appendix of gradation and compaction soil test and laboratory CBR test results

Woodward-Clyde Consultants, 1984, Geotechnical Investigation, West Access Gate and Access Road, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21487B-350. Source: Woodward-Clyde Consultants.

Study on foundation types for building, geotechnical design criteria, and pavement design and percolation rates. Includes summary of laboratory test results, location and summary logs of test holes, and gradation analysis.

Woodward-Clyde Consultants, 1984, Geotechnical Investigation, Generator Building and Retaining Wall, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21447-350. Source: Woodward-Clyde Consultants.

Evaluation of foundation alternatives and design criteria for proposed facility addition Includes summary of laboratory test results, location and summary logs of test holes, gradation analysis, and swell-consolidation test results

Woodward-Clyde Consultants, 1984, Geotechnical Engineering Services, Building 331 Parking Area, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21435-350. Source: Woodward-Clyde Consultants.

Report on subgrade conditions and pavement design Includes location and summary logs of test holes and California bearing ration test results

Woodward-Clyde Consultants, 1984, Operation and Maintenance Instructions for Rocky Flats Surface Water Control Report, Rocky Flats Plant, Jefferson County, Colorado, Prepared for Merrick and Company, Job no. 21328-350. Source: Woodward-Clyde Consultants.

Instruction manual for the Surface Water Control Project consisting of three earthfill dams and appurtenant spillways, two concrete and rockfill diversion dams, and about four miles of canals located in a circular manner outside of the security fenced area. The project is designed to collect 100-year flood runoff originating west of the plant and to divert the flow around the plant site and to store the runoff

Woodward-Clyde Consultants, 1984, Stability Evaluation-Dam B-5, Rocky Flats Plant, Near Golden, Colorado, Prepared for Merrick and Company, Job no. 21304-350. Source: Woodward-Clyde Consultants.

Evaluation of stability of Dam B-5, a detention dam located on the south fork of Walnut Creek Includes summary of laboratory test results, locations of test holes, stability and parameter development, gradation analysis, compaction test results Appendix contains copy of the report by Chen and Associates, 1978, 'Soil and Foundation Investigations for the Proposed B-5 Dam, South Walnut Creek, Rocky Flats, Jefferson County, Colorado'

Woodward-Clyde Consultants, 1983, Geotechnical and Hydrologic Engineering Services, Road Failure, Northwest Access Road, Rocky Flats Plant, Near Golden, Colorado, Prepared for Merrick and Company, Job no. 21228-350. Source: Woodward-Clyde Consultants.

Results of an investigation for remedial measures on roadway failure, as well as for general slope stability problems in the Rocky Flats area. Discusses topography, geology, subsoils, and ground water Includes locations and summary logs of test holes, geologic cross section, gradation analysis, and summary of laboratory test results

Woodward-Clyde Consultants, 1980, Geotechnical Services, Buildings 444, 447, 865, 881, 883, and Three Stacks, Rocky Flats Plant, Golden, Colorado, Prepared for Bernard Johnson, Inc., Job no. 19732-350. Source: Woodward-Clyde Consultants.

Results of geotechnical studies to determine specific engineering characteristics of foundation materials, foundation alternatives, and criteria for foundation design for proposed additions Discusses subsoils and ground water Includes locations and summary logs of test holes, gradation analysis, swell-consolidation test results, and summary of laboratory test results

Woodward-Clyde Consultants, 1980, Geotechnical Services, Sanitary Water Recycle System, ERDA Rocky Flats Plant, Golden, Colorado, Prepared for Kaiser Engineers, Job no. 18599-350. Source: Woodward-Clyde Consultants.

Study to determine specific engineering characteristics of foundation materials, foundation alternatives, and criteria for foundation design for proposed building and overhead pipeline gully crossing, and to evaluate the impact of underground conditions on construction of a buried sewer line and gravity water return lines Includes locations and summary logs of test holes, gradation analysis, swell-consolidation test results, summary of laboratory test results, and appendices of analyses and field logs

Woodward-Thorfinnson and Associates, Inc., 1974, Investigation of Ground Water Possible Contamination, Atomic Energy Commission, Rocky Flats Plant, Rocky Flats, Colorado, Prepared for Swinerton and Walberg Company, Job No. 17893-350. Source: Woodward-Clyde Consultants.

Investigation of five evaporation ponds on the northeast corner of the main plant site where water moves to the north toward Walnut Creek. Includes vicinity map and location of ground water study area, bedrock contour map, and summary logs of test holes

Woodward-Clevenger and Associates, Inc., 1974, Geotechnical Services for Proposed and Existing Landfills, Dow Chemical Rocky Flats Plant, Near Golden, Colorado, Prepared for Dow Chemical Company, Job No. 17536-350, 19 p. Source: Woodward-Clyde Consultants.

Evaluation of existing and proposed landfill sites Includes location and summary logs for test holes, gradation analysis, summary of laboratory test results, and appendix containing Chapter 4-Soils and Geology of the U S EPA publication 'Sanitary Landfill Design and Operation', 1972

Woodward-Clevenger and Associates, Inc., 1973, Geotechnical Services for Electrical Substation Plutonium Recovery Facility, Atomic Energy Commission, Rocky Flats Plant, Near Golden, Colorado, Prepared for C.F. Braun and Company, Job No. 16995-350. Source: Woodward-Clyde Consultants.

Study to determine the best types and depths of foundations and to design criteria for proposed the facility Includes location and summary logs for test holes, estimated top of bedrock and very hard bedrock contours, swell-consolidation test results, and summary of laboratory test results

Woodward-Clevenger and Associates, Inc., 1973, Evaluation of Water Rights in Area of Proposed Enlargement of Rocky Flats Reservation, Near Golden, Colorado, Prepared for the U.S. Army Corps of Engineers, Omaha, Job no. 16521-350. Source: Woodward-Clyde Consultants.

Evaluation of water rights in former Water District no 6 of Water Division no 1, which includes the South Platte River and its tributaries Discusses Coal Creek, Last Chance Ditch, and Smart Reservoir Depicts adjudicated water use facilities within the existing area and proposed enlargement of the Rocky Flats Reservation, and representative water rights purchases and major water development projects along the Front Range Includes decree transferring Eggleston no 2 and McKenzie Ditches, adjudicated water rights for Water District no 6-Coal Creek and the Platte River Basin, and stream flow records

Woodward-Clevenger and Associate, Inc., 1973, Water Level Measurements at Plutonium Recovery Facility, Atomic Energy Commission, Rocky Flats Plant, Denver, Colorado, Prepared for C.F. Braun and Company, Job No. 16450-350. Source: Woodward-Clyde Consultants.

Includes location of test holes and test pits

Woodward-Clevenger and Assoc., Inc., 1972, Engineering and Geologic Investigations, Plutonium Recovery Facilities, Atomic Energy Commission Rocky Flats Plant, Denver, Colorado, Prepared for C.F. Braun and Co., Job No. 16238-350, 17 p. Source: Woodward-Clyde Consultants.

Study to determine the best types and depths of foundations for proposed facilities and to design criteria for them Includes location and summary logs of test holes and test pits, estimated top of bedrock contours, estimated top of very hard claystone bedrock contours, laboratory test results, electrical properties test data, and detailed drilling logs

Woodward-Clevenger and Associates, Inc., 1971, Engineering and Geologic Investigation for Two Additions to Building 774, Atomic Energy Commission, Rocky Flats Facility, Prepared for Stearns-Roger Corp., Job No. 15366-350, 8 p. Source: Woodward-Clyde Consultants.

Results of investigation of underground conditions at the proposed site for additions to building 774 Includes location and summary logs of test holes, swell-consolidation test results, and suggested guide specifications for placement of compacted fill

Woodward-Clevenger and Associate, Inc., 1971, Engineering and Geologic Investigations for Building 664 and Adjacent Bridge Crane, Atomic Energy Commission, Rocky Flats Plant, Denver, Colorado, Prepared for Merrick and Company, Job no. 15036-350. Source: Woodward-Clyde Associates.

Study to determine the best types and depths of foundations and to design criteria for proposed the facilities Includes location and summary logs for test holes, swell-consolidation test results, and summary of laboratory test results.

Woodward-Clyde and Associates, 1970, Subsoil Investigation Buildings 664 and 775, Dow Chemical, Rocky Flats Plant, Near Denver, Colorado, Prepared for Merrick and Company, Job No. 12911-350. Source: Woodward-Clyde Consultants.

Subsoil investigation. Includes location and summary logs of test holes, swell-consolidation test results, and summary of laboratory test results.

Woodward-Clyde and Associates, 1970, Geological and Subsurface Investigation at Evaporating Ponds, Dow Chemical, Rocky Flats Plant, Near Denver, Colorado, Prepared for Dow Chemical Company, Job No. 12902-350. Source: Woodward-Clyde Consultants.

Results of investigation of potential landslide area north of evaporating ponds 207-A, B, and C Includes location and summary logs of test holes, suggested drain locations and details, and summary of laboratory test results

Woodward-Clyde and Associates, 1969, Subsoil Investigation and Consultation on Foundations for the Proposed Nuclear Waste Packaging Facility, 500-Foot Railroad Spur and Paved Area, Atomic Energy Commission Plant, Rocky Flats, Colorado, Prepared for Merrick & Co., 11 p, Job no. 12182-350. Source: Woodward-Clyde Consultants.

Subsoil investigation. Includes location and summary logs of test holes, swell-consolidation test results, and summary of laboratory test results

Woodward-Clyde-Sherard and Associates, 1967, Subsoil Investigation and Consultation on Pavement Design for Construction Group 703, Rocky Flats Plant, U.S. Atomic Energy Commission, Jefferson County, Colorado, Prepared for Grogan-Mccoy and Associates, Job no. 10363-350. Source: Woodward-Clyde Consultants.

Study to determine the appropriate subsoil design criteria for proposed pavements and suitability of proposed borrow areas as a source of base course and asphalt pavement aggregate Includes location and summary logs of test holes, and gradation and compaction test results

Woodward-Clyde-Sherard and Associates, 1965, Soil and Foundation Investigation for Proposed Parking Lot Construction and Changing Road Curvature at Intersection on Entrance Road at the Rocky Flats Plant of the U.S. Atomic Energy Commission, Jefferson County, Colorado, Prepared for Meurer, Serafini, and Meurer, Inc., Job no. 8605-350. Source: Woodward-Clyde Consultants.

Study to determine the appropriate subsoil design criteria for proposed parking lot construction and change in road curvature. Includes location plan and summary logs of test holes, gradation analysis, and summary of laboratory test results.

Woodward-Clyde-Sherard and Associates, 1965, Soil and Foundation Investigation at the Site of the Proposed Expansion of Utilities and Supporting Services, Atomic Energy Commission Plant, Rocky

Flats, Colorado, Prepared for Daniel, Mann, Johnson, and Mendenhall and Associates, Job no. 8475-350, 4 p. Source: Woodward-Clyde Consultants.

Study to determine the best type and depth of foundations, allowable soil pressures and ground water conditions. Includes location plan and summary logs of test holes, swell-consolidation test results, gradation analysis, and summary of laboratory test results.

Woodward-Clyde-Sherard and Associates, 1965, Soil and Foundation Investigation at the Site of the Proposed Analytical Laboratory, Building 59, Atomic Energy Commission Plant, Rocky Flats, Colorado, Prepared for Bernard Johnson Engineering, Inc., Job No. 8425-350, 3 p. Source: Woodward-Clyde Consultants.

Study to determine the best type and depth of foundations, allowable soil pressures and ground water conditions. Includes location plan and summary logs of test holes, gradation analysis, compaction test results, and summary of laboratory test results

Woodward-Clyde-Sherard and Associates, 1965, Soil and Foundation Investigation at the Site of the Proposed Additions to Building 74, Atomic Energy Commission, Rocky Flats Plant, Rocky Flats, Colorado, Prepared for Cameron Jones, Inc., Job No. 8806-350. Source: Woodward-Clyde Consultants.

Study to determine the best type and depth of foundations Includes location plan and summary logs of test pits, swell-consolidation test results, and summary of laboratory test results

Woodward-Clyde-Sherard and Associates, 1964, Subsoil Investigation at Site of Proposed Warehouse Addition North of Existing Building 51, Atomic Energy Commission, Rocky Flats Plant, Rocky Flats, Colorado, Prepared for Langhart, McGuire, and Hastings, Job No. 8111-350, 4 p. Source: Woodward-Clyde Consultants.

Results of subsoil investigation. Includes location and summary logs of test holes and test pits, and summary of laboratory test results

Woodward-Clyde-Sherard and Associates, 1964, New East West Access Road, Guard House, and Miscellaneous Pavements, Atomic Energy Commission, Rocky Flats Plant, Prepared for Meurer-Serafini-Meurer, Inc., Job No. 7564-350. Source: Woodward-Clyde Consultants.

Results of soil and foundation investigations Includes location and summary logs of test holes and test pits, gradation analysis, swell-consolidation test results, compaction test results, laboratory CBR test results, and summary of laboratory test results

Woodward-Clyde-Sherard and Associates, 1964, Subsoil Investigation at site of Proposed Additions Fabrication Building, Dow Chemical Company, Rocky Flats Division, Denver, Colorado, Prepared for Catalytic Construction Company, Job No. 7464-350. Source: Woodward-Clyde Consultants.

Results of subsoil investigation. Includes location and summary logs of test holes, swell-consolidation test results, and summary of laboratory test results

Woodward-Clyde-Sherard and Associates, 1963, Soil and Foundation Investigation at Building 86, Dow Chemical Plant, Rocky Flats, Prepared for Stearns-Roger Corporation, Job No. 7067-350. Source: Woodward-Clyde Consultants.

Soil and foundation investigation.

Woodward-Clyde-Sherard and Associates, 1963, Subsoil Investigation at Site of Proposed New Radiology Addition North of Existing Building 77, Rocky Flats, Prepared for Stearns-Roger Manufacturing Company, Job No. 6400-350. Source: Woodward-Clyde Consultants.

Subsoil investigation.

**Woodward-Clyde-Sherard and Associates, 1961, Subsoil Investigation at Site of Proposed New Office and Cafeteen Building 78, U.S. Atomic Energy Commission Plant, Rocky Flats, Colorado, Prepared for Miner and Miner Consulting Engineers, Inc., Job No. 5270-350.
Source: Woodward-Clyde Consultants.**

Subsoil investigation.

Woodward-Clyde and Associates, 1955, Foundation Investigation for Proposed New Building 83, Rocky Flats Plant, U.S. Atomic Energy Commission, Prepared for Catalytic Construction Company, Job No. D350a-350. Source: Woodward-Clyde Consultants.

Foundation investigation for proposed new building 83 Includes location and summary test holes, consolidation test results, swell-consolidation test results, summary of laboratory test results, soil sample visual classification, and unified soil classification system

**Woodward-Clyde and Associates, 1955, Foundation Investigation for Rocky Flats Plant Expansion, U.S. Atomic Energy Commission, Prepared for Catalytic Construction Company, Job No. D350b-350.
Source: Woodward-Clyde Consultants.**

Foundation investigation for proposed new buildings 76, 77, 99, and an addition to 81 Includes location and summary test holes, consolidation test results, soil sample visual classification, and unified soil classification system.

Young, E.J., 1985, Summary of the Geology, Economic Aspects, and Geochemistry of the Schwartzwalder Uranium-Bearing Area, Ralston Buttes District, Jefferson County, Colorado, USGS Bulletin 1555, 32 p., 2 pl. Source: USGS Library (200)M, Distribution $4.50.

Study of the relations between uraniferous mines and prospects in the Front Range near Golden Describes the regional geologic setting, structural geology, radiometric and mineralogic data, and geochemistry Includes a geologic map and a radiometric and mineralogic map of the Schwartzwalder area

Zeff, Cogorno, and Searly, Inc., 1974, Report of Subsurface Studies for U.S. Atomic Energy Commission Sanitary Landfill Renovations, Rocky Flats Plant, Golden, Colorado, Contract No. AT(29-2)-3422, Project No. 13759, 19 p. Source: Rocky Flats Soil Investigation Files.

Results of subsurface studies made for the proposed site of the Sanitary Landfill Renovations at the Rocky Flats Plant. Field and laboratory investigations of subsoil conditions were made with the use of borings and test pits. Samples were inspected both visually and in a laboratory to evaluate the physical and mechanical properties Includes description of the setting, seismicity, which was noted as a zone 1 seismic risk area, the natural slope stability, and subsurface conditions The sampling structure and borrow areas with their findings are described Groundwater studies indicate that the dominant flow is through the alluvium above the bedrock surface A second type is within the fracture zones of the claystone bedrock. Complete design considerations are given in conjunction with the results Included is site location plan, slope map, typical cross-section of sampling structure, gradation analysis and graphs of soils. Appendices explain field investigations and laboratory testing

Zoback, M.L., and Zoback, M., 1980, State of Stress in the Conterminous United States, Journal of Geophysical Research, Paper #80B1093, vol. 85, no. B-11, 2 pl., p. 6113-1656. Source: USGS Library S(200) Am82gt.

Study attempts to map the modern stress field (primarily Quaternary in the western United States and Tertiary and younger in the east) in the conterminous United States Determined principal stress orientations from geologic observations, earthquake focal mechanisms, and in situ stress measurements Categorized broad regions by orientation of the principal stresses and by their relative magnitudes, as inferred from currently active tectonism The major contribution of the study is the inclusion of new geologic data on the orientation of the stress field, largely in the United States Colorado stress data is provided for the Rocky Mountain Arsenal, Henderson Project, Piceance Basin, Rangely, and Wattenberg.

MAPS, CHARTS, AND GRAPHICS

Behrendt, J.C., and Bajwa, L.Y., 1974, Bouguer Gravity Map of Colorado, USGS Geophys. Inv. Map GP-895, Lat 37* to 41*, long 102* to 109*, scale 1:500,000, gravity-contour interval millicals, sheet 41x51.5 inches. Source: USGS Library M(200)GP, USGS distributes $2.40.

Map illustrates the state of Colorado as a series of gravity contour lines

Behrendt, J.C., and Bajwa, L.Y., 1974 (r 1975), Bouguer Gravity and Generalized Elevation Maps of Colorado, USGS Geophys. Inv. Map GP-896, 2 sheets, Lat 37* to 41*, long 102* to 109*, scale 1:1,000,000, sheet 1-gravity map, 23x29 inches, sheet 2-elevation map, 22x29 inches. Source: USGS Library, USGS distributes $5.50.

Map illustrating the Bouguer gravity and generalized elevation of Colorado

Blair, R.W., 1951, Subsurface Geologic Cross Sections of Mesozoic Rocks in Northeastern Colorado, USGS Oil and Gas Investigation Chart OC-42 (2 sheets). Source: USGS Library M(200)OC, not avail. for purchase.

Chart shows stratigraphy of subsurface and exposed mesozoic rocks in northern Colorado in parts of Larimer, Clear Creek, Jefferson, Yuma, and Sedgwick Counties

Chase, G.H., and McConaghy, J.A., 1972 (R 1973), Generalized Surficial Geologic Map of the Denver Area, Colorado, USGS Misc. Geol. Inv. Map I-731, Lat 39*22'30" to 40*, long 104*37'30" to 105*20', scale 1:62,500, sheet 41.5x51 inches. Source: USGS Library M(200)I, USGS distributes $3.10.

Portrays areal distribution of 12 map units and briefly describes lithologic character and water-yielding characteristics of included formations Geology was mapped and compiled between 1956 and 1963

Colton, R.B., and Lowrie, R.L., 1973, Map Showing Mined Areas of the Boulder-Weld Coal Field, Colorado, USGS Misc. Field Studies Map MF-513, Lat 39*55' to 40*07'30", long 104*52'30" to 105*15', scale 1:24,000, sheet 22x34 inches. Source: USGS Library M(200)MF, not avail. for purchase.

Map reveals that the depth to mined coal resources increases generally from west to east and ranges from zero at the outcrop to 500 feet. Shows mined areas, approximate shaft locations, slope or drift entries, and faults Is out of range of Rocky Flats

Colton, R.B., and Holligan, J.A., 1977, Photo Interpretative Map Showing Areas Underlain by Landslide Deposits and Areas Susceptible to Landsliding in the Louisville Quadrangle, Boulder and Jefferson Counties, Colorado, USGS Misc. Field Studies Map MF-871, Lat 39*52'30" to 40*, long 105*07'30" to 105*15', scale 1:24,000, 1 sheet. Source: USGS Library M(200)MF, USGS distributes $1.50.

Map shows landslide deposits, active landslides, susceptible area, and stable areas for an area bounded by Boulder on the northwest, Rocky Flats on the southwest, the Great Western Reservoir on the southeast, and Louisville on the northeast.

Crosby, E.J., 1976 (r 1977), Map Showing Nonmettalic Mineral Resources (Except Fuels) in Bedrock, Front Range Urban Corridor, Colorado, USGS Misc. Geol. Inv. Map 1-965, Lat 38*37'30" to 40*37'30", long 104*37'30" to 105*22'30", scale 1:100,000, sheet 1, 34x44 inches, sheets 2-39x48 inches. Source: USGS Library M(200)I, USGS distributes $6.10.

Maps show areas of outcrop of bedrock units containing nonmettalic resources and distribution of pits, quarries, and mines, the accompanying pamphlet discusses occurrence, production, and uses of these resources Map A shows Boulder and Ft. Collins-south to baseline road in Boulder Map A shows the Greater Denver area, south to Castle Rock, west to Golden Gate Canyon-includes Rocky Flats Map C shows the Pike National Forest to the border between Douglas and Elbert Counties, and south to Carson

Danielson, T.W., 1975, Lakes in the Greater Denver Area, Front Range Urban Corridor, Colorado, USGS Misc. Geol. Inv. Map I-856-B, Lat 39*22'30" to 40*, long 104*37'30" to 105*22'30", scale 1:100,000, sheet 36x36.5 inches. Source: USGS Library M(200)I, USGS distributes $2.40.

Map shows ranges of specific conductance for each lake, surface area, shoreline length, pH, and biological characteristics for an area west to the Arapahoe Forest, east to Elbert County, south to Pike National Forest, and north to Boulder. Includes Rocky Flats

Drew, L.J., Schuenemeyer, J.H., and Bawiec, W.J., 1979, Petroleum exhaustion maps of the Cretaceous "D-J" Sandstone stratigraphic interval of the Denver Basin--Exhaustion Sequence Maps of Detailed Study Area Plotted by Assuming 2-MI2 Targets, USGS Misc. Geol. Inv. Map I-1138, 4 sheets, sheet-1 40x47 inches, Lat 41*15' to 41*30', long 103*30' to 103*45, scale 1:150,000, sheets-2, 3, and 4 28x58 inches, Lat 39*30' to 41*45', long 103* to 104*15', scale 1:200,000, accom. by 7 p text. Source: USGS Library M(200)I, USGS distributes $9.70.

Illustrates the physical exhaustion of an oil-producing horizon in a large area as exploration activity progressed Depicts over 22,000 wells, drilled in the Denver Basin between 1949-1974 Physical exhaustion maps are presented yearly for a small area of intensive drilling and at selected intervals for the entire basin Includes descriptive statistics of the exploration process

Driscoll, L.B., 1975 (R 1976), Land-Use Classification of the Greater Denver Area, Front Range Urban Corridor, Colorado, USGS Misc. Geol. Inv. Map I-856-E ($1.75), Lat 39*22'30" to 40*, long 104*37'30" to 105*22'30", scale 1:100,000, sheet 31.5x38 inches. Source: USGS Library M(200)I, USGS distributes $3.60.

Map provides a two-level classification of the distribution of 24 land-use categories in the Greater Denver area, including Rocky Flats, under six main divisions--agricultural land, barren land, forest, range, urban, and water Also shows roads, railroads, and powerlines

Gardner, M.E., Simpson, H.E., and Hart, S.S., 1971 (R 1972), Preliminary Engineering Geologic Map of the Golden Quadrangle, Jefferson County, Colorado, USGS Misc. Field Studies Map MF-308 ($4.50), (6 sheets) sheet 1-Lat 39*45' to 39*52'30", long 105*07'30" to 105*15', scale 1:24,000, sheet

2-structure contour intervals, 50 & 250 ft., each sheet 22.5x34 inches, accom. by 21 page text. Source: USGS Library M(200)MF, USGS distributes $9.10.

Provides a guide to the engineering characteristics of both the bedrock and the overlying, unconsolidated surficial materials, areal distribution of the different kinds of rock and earth materials, and cross sections showing vertical relations of rock and earth materials

Hampton, E.R., 1975, Map Showing Availability of Hydrologic Data Published by the U.S. Environmental Data Svc., the U.S. Geol. Survey, and Cooperating Agencies, Greater Denver Area, Front Range Urban Corridor, Colorado, USGS Misc. Geol. Inv. Map I-856-C ($1.25), Lat 39*22'30" to 40*, long 104*37'30" to 105*22'30", scale 1:100,000, sheet 33.5x36.5 inches. Source: USGS Library M(200)I, USGS distributes $2.40.

Map of the Greater Denver area between Boulder and Golden shows hydrologic data by symbols and color Presents climatological data including precipitation, temperature, and evaporation, surface water data of stage and discharge of streams, chemical quality of streams, lakes, and reservoirs, and sediment load of streams, and ground water data showing water levels and chemical quality

Hillier, D.E., Schneider, P.A., Jr., and Hutchinson, E.C., 1983, Well Yields and Chemical Quality of Water from Water-Table Aquifers in the Greater Denver Area, Front Range Urban Corridor, Colorado, USGS Misc. Geol. Inv. Map I-856-J, 2 sheets, Lat 39*22'30" to 40*, long 104*37'30" to 105*22'30", scale 1:100,000, sheet 1-33x36 inches, sheet 2-33x38 inches. Source: USGS Library M(200)I, USGS distributes $6.70.

Shows yields ranging from less than 100 to 3,500 g/min which have been measured and reported from industrial, irrigation, and public-supply wells completed in unconsolidated alluvial deposits and in the Dawson, Denver, and Arapahoe aquifers Most of the unconsolidated alluvial deposits in the northern two-thirds of the area yield water containing dissolved-solids concentrations of more than 500 mg/L Water quality constituents include iron, manganese, magnesium, nitrogen, selenium, and sulfate

Hillier, D.E., Schneider, P.A., Jr., and Hutchinson, E.C., 1983, Depth to the Water Table (1976-1977) in the Greater Denver Area, Front Range Urban Corridor, Colorado, USGS Misc. Geol Inv. Map I-856-K, Lat 39*22'30" to 40*, long 104*37'30" to 105*22'30", scale 1:100,000. Source: USGS Library M(200)I, USGS distributes $3.10.

Shows that depths to the water table in unconsolidated alluvial aquifers ranged from 1 1 to 55 5 feet during 1976-1977 Depths to the water table in the consolidated rock of the Dawson, Denver, and Arapahoe aquifers generally ranged from 20 feet to 100 feet.

Hunter, M., 1955, Geology of the Foothills of the Front Range in Northern Colorado, Rocky Mountain Association of Geologists Map, scale 1:48,000. Source: CSM MPRM.

Map shows the outcrop sedimentary rocks on the east flank of the Front Range north of Golden, Colorado to the Wyoming-Colorado boundary Includes the sedimentary rocks from the contact of the fountain formation on Pre-Cambrian rocks to the Hygiene member of the Pierre Formation When possible map is extended on the eastern margin to the Laramie Formation Information concerning the geologic formations of the area are described in detail on the map along wiht visual images

Kiteley, L.W., 1978, Stratigraphic Sections of Cretaceous Rocks of the Northern Denver Basin, Northeastern Colorado, and Southeastern Wyoming, USGS Oil and Gas Investigation Chart OC-78. Source: USGS Library M(200)OC, USGS distributes $7.30.

Chart shows selected well locations, lines of cross sections, and formations for an area cornered by Laramie and Cheyenne in Wyoming and Jefferson County and Adams County in Colorado

Lindvall, R.M., 1972, Geologic Map of the Arvada Quadrangle, Adams, Denver, and Jefferson Counties, Colorado, USGS Misc. Geol. Field Studies Map MF-348, 2 sheets: sheet 1, Lat 39*45' to 39*52'30", long 105* to 105*07'30", scale 1:24,000, each sheet 20x31 inches. Source: USGS Library M(200)MF, not avail. for purchase.

The Arvada Quadrangle, bounded by Standley Lake in the northwest, Thornton in the northeast, Speer Boulevard and I-25 in the southeast, and Lakewood in the southwest, shows the distribution and physical description of unconsolidated surficial deposits. Rocky Flats is not shown

Lovering, T.S., and Goddard, E.N., 1950 (r 1951), Geologic Map of the Front Range Mineral Belt, Colorado, USGS Monograph 50-1 (Issued as pl. 2 of USGS Prof. Paper 223), 2 sheets, scale 1:62,500. Source: USGS Library (200)B, not avail. for purchase.

Shows Precambrian to Quaternary Formations in an area that includes parts of Larimer, Fremont, and Chaffee Counties

Lovering, T.S., and Goddard, E.N., 1950 (r 1951), Veins, faults, and mines of the Front Range Mineral Belt, Colorado, USGS Monograph 50-4 (Issued as pl. 3 of USGS Prof. Paper 223), 2 sheets, scale 1:62,500. Source: USGS Library (200)B, not avail. for purchase.

Map is missing from USGS Professional Paper 223 and is otherwise unavailable

Machette, M.N., 1975, Geologic Map of the Lafayette Quadrangle, Adams, Boulder, and Jefferson Counties, Colorado, USGS Misc. Field Studis Map MF-656, Lat 39*52'30" to 40*, long 105* to 105*07'30", scale 1:24,000, sheet 29x40 inches. Source: USGS Library M(200)MF, not avail. for purchase.

The Lafayette Quadrangle, bounded on the northwest by Lafayette, on the southwest by Ketner Reservoir, on the southeast by Thornton, and on the northeast by 160th Avenue and I-25, shows faults, railroads, artificial fill, mines, and altitude Depicts soil horizon and stratigraphic relationships between alluvial, colluvial, and eolian deposits.

McCain, J.F., and Hotchkiss, W.R., 1975, Map Showing Flood-Prone Areas in the Greater Denver Area, Front Range Urban Corridor, Colorado, USGS Misc. Geol. Inv. Map I-856-D, Lat 39*22'30" to 40*, long 104*37'30" to 105*22'30", scale 1:100,000, sheet 32x33.5 inches. Source: USGS Library M(200)I, USGS distributes $2.40.

Depicts a broad-scale view of the flood-prone areas along the principal streams in the Greater Denver area between Boulder and Golden Provides an index to more detailed sources of flood-plain information, a diagram showing the status of flood-prone area maps, and flood information reports for the study area.

Norris, J.M., Robson, S.G., and Parker, R.S., 1985, Summary of Hydrologic Information for the Denver Coal Region, Colorado, USGS Water Resources Investigation 84-4337, 68 p. Source: USGS Library (200)WRI, availability unknown.

Figure 29, page 48, depicts the approximate location and extent of bedrock aquifers, Figure 30, page 49, provides generalized geologic sections (one from west to east, another from north to south), Plate 1 shows the approximate extent and water-table altitudes of major Alluvial Aquifers, Plate 2 shows the altitude of the potentiometric surface in the Denver Aquifer; and Plate 3 shows dissolved-solids concentrations of the water in the Denver Aquifer

Office of the State Engineer, 1985, Location Map for Hydrogeological Cross-Sections, Colorado Division of Water Resources, scale 1:250,000. Source: CO Div. of Water Resources and distributes $3.

Map shows the location of the 15 Denver Basin cross-sections (see Office of the State Engineer, Denver Basin Cross-Sections) Sites geophysical log C-C1 that extends from the vicinity of the Rocky Flats Plant to Broomfield

Office of the State Engineer, 1985, Denver Basin Cross-Sections, Colorado Division of Water Resources, 15 sections. Source: CO Div. of Water Resources and distributes $35/set; $3 each.

Contains 11 east-west and four north-south sections based on geophysical logs and shows hydrogeological correlation of aquifers throughout the Denver Basin. Sheet 3 of 15, cross-section C-C1, sections C1, C2, and C3 are applicable to the study area. C1 is the Remington Deep Well #1 in section 25, T 2 S, R. 70 W, C2 is the N W Water Development Well #7 in section 19, T 2 S, R 68 W, and C3(L-14 intersecting log) is the LFH 1 P#26944-F in section 3, T 2 S, R 68 W The logs reflect data for the Arapahoe Aquifer, Laramie Formation (upper shale portion), Laramie-Fox Hills Aquifer, and Pierre Shale

Office of the State Engineer, 1987, Aquifer Map of the Denver Basin, Colorado Division of Water Resources, scale 1:250,000. Source: CO Div. of Water Resources and distributes $3.

Map shows the location of the outcrop/subcrop of the various aquifers in the Denver Basin Identifies the approximate hydrogeologic contact and fault lines

Office of the State Engineer, 1987, Designated Ground Water Basins and Management District Boundaries, Colorado Division of Water Resources, scale 1:1,000,000. Source: CO Div. of Water Resources and distributes $6.

Map shows the boundaries of Colorado's seven water divisions and 80 water districts Includes boundaries of designated basins and management districts The study area lies in the South Platte Water Division #1 and overlaps Divisions #6 (Boulder), #7 (Golden), and #2 (Broomfield)

Pierce, K.L., and Schmidt, P.W., 1975, Reconnaissance Map Showing Relative Amounts of Soil and Bedrock in the Mountainous Part of the Ralston Buttes Quadrangle and Adjoining Areas to the East and West in Jefferson County, Colorado, USGS Misc. Field Studies Map MF-689, Lat 39*45' to 39*52'30", long 105*14' to 105*24', scale 1:24,000, sheet 27.5x37.5 inches. Source: USGS Library M(200)MF, USGS distributes $1.50.

Map shows relative amounts of soil and hard bedrock within the upper six feet of land surface Descriptive chart covers landscape characteristics, relative constraints regarding septic systems with leach fields, and relative ease of excavating in the upper six feet for map units ranging from alluvial soil to mostly rock.

Pierce, K.L., and Schmidt, P.W., 1975, Reconnaissance Map Showing Relative Amounts of Soil and Bedrock in the Mountainous Part of the Eldorado Springs Quadrangle, Boulder and Jefferson Counties, Colorado, USGS Misc. Field Studies Map MF-695, Lat 39*52'30" to 40*, long 105*15' to 105*22'30", scale 1:24,000, sheet 28x38 inches. Source: USGS Library M(200)MF, USGS distributes $1.50.

Map shows relative amounts of soil and hard bedrock within the upper six feet of land surface Descriptive chart covers landscape characteristics, relative constraints regarding septic systems with leach fields, and relative ease of excavating in the upper six feet for map units ranging from alluvial soil to mostly rock.

Robson, S.G., 1983, Hydraulic Characterization of the Principal Bedrock Aquifers in the Denver Basin, Colorado, USGS Hydro. Inv. Atlas HA-659, 3 sheets, Lat 39* to 40*, long 104* to 105*, scale 1:500,000, sheets 34x67 inches. Source: USGS Library, USGS distributes $10.90.

Studies indicate that hydraulic conductivity values for the principal bedrock aquifers of the Denver Basin range from about 0 05 to 7 ft/d, with the highest values occurring in the suburban area south of Denver in the Arapahoe and Laramie-Fox Hills aquifers

Robson, S.G., and Romero, J.C, 1981, Geologic Structure, Hydrology, and Water Quality of the Denver Aquifer in the Denver Basin, Colorado, USGS Hydro. Inv. Atlas HA-646, 3 sheets, Lat 39* to 40*, long 104* to 105*, scale 1:500,000, sheet 1-27x37 inches, sheet 2-22x26 inches, sheet 3-27x30 inches. Source: USGS Library, USGS distributes $8.80.

Geologic structure, depth to the base, total sandstone and siltstone thickness, and potentiometric surfaces for 1958 and 1978 were mapped Ground water generally is a calcium bicarbonate or sodium bicarbonate type with dissolved-solids concentrations commonly ranging from 100 to 500 milligrams per liter and dissolved-iron concentrations as high as 600 micrograms per liter in a few areas

Robson, S.G., Romero, J.C., and Zawistowski, S., 1981, Geologic Structure, Hydrology, and Water Quality of the Arapaho Aquifer in the Denver Basin, Colorado, USGS Hydro. Inv. Atlas HA-647, 3 sheets, Lat 39* to 40*, long 104* to 105*, scale 1:500,000 & 1:250,000, sheet 1-36x41 inches, sheet 2-27x40 inches, sheet 3-33x40 inches. Source: USGS Library, USGS distributes $9.10.

Geologic structure, depth to the base, and total conglomerate, sandstone, and siltstone thickness, and potentiometric surfaces for 1958 and 1978 were mapped Ground water generally is of the sodium bicarbonate type with dissolved-solids concentrations commonly ranging from 200 to 1,000 milligrams per liter Concentrations of dissolved-sulfate in excess of 250 milligrams per liter occur in a 350-square mile area along the N W margin of the aquifer

Robson, S.G., Wacinski, A., Zawistowski, S., and Romero, J.C., 1981, Geologic Structure, Hydrology, and Water Quality of the Laramie-Fox Hills Aquifer in the Denver Basin, Colorado, USGS Hydro.

Inv. Atlas HA-650, 3 sheets, Lat 39* to 40*, long 104* to 105*, scale 1:500,000, sheet 1-35x41 inches, sheet 2-26x45 inches, sheet 3-31x42 inches. Source: USGS Library, USGS distributes $9.10.

Geologic structure, depth to the base, total sandstone and siltstone thickness, and potentiometric surfaces for 1958 and 1978 were mapped Ground water generally is of the sodium bicarbonate type

Romero, J.C., and Hampton, E.R., 1972, Map Showing the Approximate Configuration and Depth to the Top of the Laramie-Fox Hills Aquifer, Denver Basin, Colorado, USGS Misc. Geol. Inv. Map I-791, Lat 38*45' to 40*30', long 104* to 105*, scale 1:500,000, contour intervals-100 and 500 ft., sheet 22x30.5 inches. Source: USGS Library M(200)I, USGS distributes $2.40.

Defines available water resources via configuration, altitude, and depth to the top of the Laramie-Fox Hills aquifer

Schwochow, S.D., Shroba, R.R., and Wicklein, P.C., 1974 (r. 1975), Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties, CO Geol. Survey SB-5-A, 43 p., 11 figs., 2 tables, 3 pls. Source: USGS Library, USGS distributes $5.

Text and three regional maps at scale 1.250,000 from the comprehensive photo geologic and field geologic evaluation of 271 quadrangles in Larimer, Weld, Boulder, Jefferson, Adams, Denver, Arapahoe, El Paso, and Pueblo Counties (See accompanying maps 74-1)

Schwochow, S.D., Shroba, R.R., and Wicklein, P.C., 1974 (r. 1975), Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties, CO Geol. Survey Special Pub. SB-5-B, scale 1: 75,000, 215 figs. Source: USGS Library, not avail. for purchase.

Compilation of reduced-scale preliminary maps

Schwochow, S.D., Shroba, R.R., and Wicklein, P.C., 1974 (r. 1975), Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties, CO Geol. Survey Open-File Report 74-1, scale 1:24,000. Source: USGS Library, availability unknown.

Detailed quadrangle maps

Schwochow, S.D., 1981, Inventory of Nonmetallic Mining and Processing Operations in Colorado (Including Front Range Urban Corridor), 16 pl., CO Geol. Survey MS 17. Source: unknown, CO Geol. Srv. distributes $20.

Inventory maps presenting Colorado's mineral resources in terms of quantity, chemical composition, physical properties, location, and possible use. Resources covered include coal, oil and gas, geothermal, uranium, thorium, and vanadium, with other metallics in progress The maps demonstrate the variety of nonmetals mined in Colorado, the widespread distribution of these operations compared to those fo matallics and fuels, and the interrelationship of contsruction materials production, transportation routes, and centers of population

Scott, G.R., and Cobban, W.A., 1965, Geologic and Biostratigraphic Map of the Pierre Shale Between Jarre Creek and Loveland, Colorado, USGS Misc. Geol. Inv. Map I-439, Lat 39*32'30"

to 40*22'30", long 104*50' to 105*17'30", scale 1:48,000, sheet 41.5x56.5 inches, accom. by 4 p. text. Source: USGS Library M(200)I, USGS distributes $3.60.

The Pierre Shale, 5,000-8,000 feet thick in the mapped area, is divided into several stratigraphic units in which 17 ammonite zones have been mapped Delineates two well-known anticlines, and the possibility of buried structures through local flattenings of dip where single ammonite zones are spread across abnormally wide outcrop areas

Sheridan, D.M., Maxwell, C.H., Albee, A.L., and Van Horn, R., 1958, Preliminary Map of Bedrock Geology of the Ralston Buttes Quadrangle, Jefferson County, Colorado, USGS Misc. Field Studies Map MF-179, Lat 39*45' to 39*52'30", long 105*15' to 105*22'30", scale 1:24,000, contour interval 50 ft. Source: USGS Library M(200)MF, not avail. for purchase.

Map shows sedimentary rocks, Precambrian rocks, fault systems, and formations for 58 square miles on the eastern flank of the Front Range within the Ralston Buttes Quadrangle

Simpson, H.E., 1973, Map Showing Landslides in the Golden Quadrangle, Jefferson County, Colorado, USGS Misc. Geol. Inv. Map I-761-B ($1.50), Lat 39*45' to 39*52'30", long 105*07'30" to 105*15', scale 1:24,000, sheet 29x42 inches. Source: USGS Library M(200)I, USGS distributes $3.10.

Classifies landslides in terms of the certainty of their existence, indicates which landslides are now active and which have been corrected by excavation or stabilization Text defines terms, explains the causes and process of landsliding, and characterizes the significance of landslides to land-use planners, engineers, developers, students, landowners, and others

Simpson, H.E., 1973, Map Showing Areas of Potential Rockfalls in the Golden Quadrangle, Jefferson County, Colorado, USGS Misc. Geol. Inv. Map I-761-C ($1.50), Lat 39*45' to 39*52'30", long 105*07'30" to 105*15', scale 1:24,000, sheet 29x42 inches. Source: USGS Library M(200)I, USGS distributes $3.10.

Classifies areas that may yield rockfalls and areas subject to bounding, rolling, and sliding rock, if they occur, in terms of the estimated likelihood of occurrence Text defines terms, explains the causes and processes of rockfall, suggests precautionary measures, and characterizes the significance of rockfalls to land-use planners, engineers, developers, students, landowners, and others

Simpson, H.E., 1973 (r 1974), Map Showing Earth Materials That May Compact and Cause Settlement in the Golden Quadrangle, Jefferson County, Colorado, USGS Misc. Geol. Inv. Map I-761-D ($1.25), Lat 39*45' to 39*52'30", long 105*07'30" to 105*15', scale 1:24,000, sheet 29x42 inches. Source: USGS Library M(200)I, USGS distributes $2.40.

Shows two kinds of earth materials--windblown silt and stream-deposited organic silt--that are subject to natural compaction, especially if loaded or wetted The compaction may cause settlement of the ground and possible damage to structures Text defines terms, explains the process of compaction, and characterizes its significance to land-use planners, engineers, developers, students, landowners, and others

Simpson, H.E., 1973, Map Showing Man-Modified Land and Man-Made Deposits in the Golden Quadrangle, Jefferson County, Colorado, USGS Misc. Geol. Inv. Map I-761-E ($1.50), Lat 39*45' to 39*52'30", long 105*07'30" to 105*15', scale 1:24,000, sheet 29x42 inches. Source: USGS Library M(200)I, USGS distributes $3.10.

Classifies areas of man-modified deposits and man-made land as to their purpose Text characterizes their significance to land-use planners, engineers, developers, students, landowners, and others

Spencer, F.D., 1961, Bedrock Geology of the Louisville Quadrangle, Colorado, USGS Geol. Quad. Map GQ-151, Lat 39*52'30" to 40*, long 105*07'30" to 105*15'. scale 1:24,000, contour interval 10 ft. Source: USGS Library M(200)GQ, USGS distributes $3.60.

Map shows bedrock of the Laramie Formation, Fox Hills sandstone, and Pierre shale, points of contact, fault lines, strike and dip of overturned beds, structure contours, mines, sand, gravel, or clay pits, and drill holes with show of gas Includes lithologic cross section and lengthy description of stratigraphy, structure, and economic geology of clay, sand and gravel, ground water, coal, and oil and natural gas resources Area covers part of Rocky Flats

Trimble, D.E., and Machette, M.N., 1979, Geologic Map of the Greater Denver Area, Front Range Urban Corridor, Colorado, USGS Misc. Geol. Inv. Map I-856-H, Lat 39*22'30" to 40*, long 104*37'30" to 105*22'30", scale 1:100,000, sheet 36x39 inches. Source: USGS Library M(200)I, not avail. for purchase.

Map is missing from the USGS collection

Trimble, D.E., and Fitch, H.R., 1974, Map Showing Potential Sources of Gravel and Crushed-Rock Aggregate in the Greater Denver Area, Front Range Urban Corridor, Colorado, USGS Misc. Geol Inv. Map I-856-A, Lat 39*22'30" to 40*, long 104*37'30" to 105*22'30", scale 1:100,000, sheet 37x44 inches. Source: USGS Library M(200)I, USGS distributes $3.60.

Color patterns reveal the distribution of potential sources of three categories of gravel and crushed-rock aggregate from four types of rock Gravel size distribution is shown by pie diagrams, thicknesses of deposits are shown by random figures The best quality and most abundant gravel resources occur along the South Platte River, Clear Creek, and Bear Creek

Van Horn, R., 1957, Bedrock Geology of the Golden Quadrangle, Colorado, USGS Geol. Quad. Map GQ-103, Lat 39*45' to 39*52'30", long 105*07'30" to 105*15', scale 1:24,000, contour interval 10 ft. Source: USGS Library M(200)GQ, USGS distributes $3.60.

Map shows bedrock of the Laramie Formation, Fox Hills sandstone, and Pierre shale, points of contact, fault lines, strike and dip of overturned beds, structure contours, mines, sand, gravel, or clay pits, and drill holes with show of gas Includes lithologic cross section and lengthy description of stratigraphy, structure, and economic geology of clay, sand and gravel, ground water, coal, and oil and natural gas resources Area covers part of Rocky Flats

Van Horn, R., 1968, Preliminary Surficial Geologic Map and Materials Test Data of the Golden Quadrangle, Jefferson County, Colorado, USGS unn O-F Rpt., 3 sheets, 1:24,000. Source: USGS

Illustrates 8 of the streams which have truncated tilted bedrock and have formed eastward-sloping alluvial plains in the Golden quadrangle Describes the plains formed, the alluvium, and deposits Illustrations included are local alluvium fans, residuum, over 90 landslide areas, colluvium, loess, artificial fill, and bedrock outcrops Deposits less than 3 feet are not shown Results of materials test data represent the gross characteristics of the geologic formations involved Report is noted as being a preliminary report and had not, at the time, been edited for conformity with USGS standard and nomenclature

Van Horn, R., 1972, Surficial and Bedrock Geologic Map of the Golden Quadrangle, Jefferson County, Colorado, USGS Misc. Geol. Inv. Map I-761-A ($1.50), Lat 39*45' to 39*52'30", long 105*07'30" to 105*15', scale 1:24,000, sheet 29x42 inches. Source: USGS Library M(200)I, USGS distributes $3.60.

Map describes and locates formations for an area bounded by Rocky Flats on the northwest, Standley Lake on the northeast, 20th Avenue and Simms Street on the southeast, and Golden on the southwest

VanSlyke, G., Romero, J., Morevec, and Wacinski, A., 1988, Geologic Structure, Sandstone/Siltstone Isolith, and Location of Non-Tributary Ground Water for (the Dawson [DBA-1], Denver [DBA-2], Arapahoe [DBA-3], and Laramie-Fox Hills [DBA-4]) Aquifers, Denver Basin, Colorado, 4 Plates Source: CO Div. of Water Resources and distributes $20 each/$60 set of 4-reduced price.

Atlases expand and refine the previous work of the USGS and the Colorado Division of Water Resources--distributed by the USGS as HA 643, HA 646, HA 647, and HA 650, 1981 The Dawson Aquifer is in T. 4 S to T 13 S, R. 68 W to R 61 W, Denver is in T 1 N to T 14 S, R 70 W to R 61 W, Arapahoe is in T 2 N to T 15 S, R 70 W to R 59 W, and the Laramie-Fox Hills is in T 5 N to T 15 S, R 70 W to R 58 W which intersects with the eastern part of the study area

Wells, J.D., 1963, Preliminary Geologic Map of the Eldorado Springs Quadrangle, Boulder and Jefferson Counties, Colorado, USGS Misc. Geol. Inv. Map I-383, Lat 39*52'30" to 40*, long 105*15' to 105*22'30", scale 1:24,000, contour interval 50 ft., sheet 30x40 inches. Source: USGS Library M(200)I, not avail. for purchase.

Map shows alluvium, formations, faults, and strikes and dips for an area that extends from Boulder in the northeast to Hurricane Hill Fault in the southwest (Jefferson County) with part of Rocky Flats occupying the southeast corner

Whitkind, I.J., 1976, Preliminary Map Showing Known and Suspected Active Faults in Colorado, USGS Open-File Report 76-154, 42 p. Source: USGS Library (200) R290, USGS distributes $9 75.

Map of known and suspected active faults in the northern Rocky Mountains Includes pertinent data about each fault and historic breaks of other faults that have been recurrently active since the middle Miocene

Wrucke, C.T., and Wilson, R.F., 1967, Geologic Map of the Boulder Quadrangle, Boulder County, Colorado, USGS Open-File Temp. 596, Lat 105*22'30" to 105*15', long 40*07'30" to 40*00', scale 1:24,000, 2 sheets. Source: USGS Library behind Reference Desk, not avail. for purchase.

Polyconic projection shows topography by elevation with the city of Boulder occupying the southeast corner of the quadrangle. The accompanying sheet color codes rock types and lists combinations of rock types (i.e., Alluviums, Boulder Creek Granodiorite, various formations, shales, and sandstones) and their ages.